catalysts

MDPI

Supplementary Material

Upgrading mixed agricultural plastic and lignocellulosic waste to liquid fuels by catalytic pyrolysis

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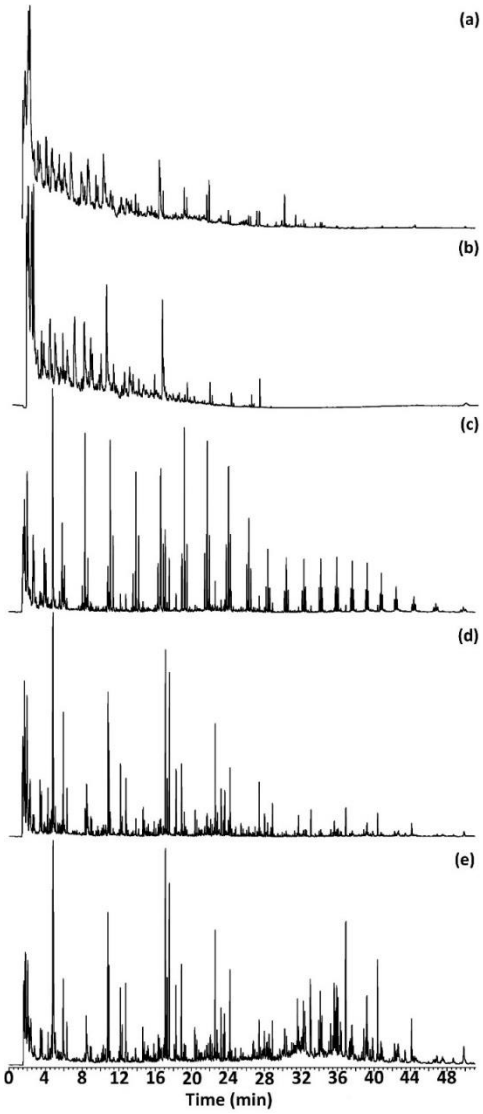

Figure S1. Py-GC-MS chromatograms at 500 °C of (a) bluegrass (BG), (b) chaff, (c) net wrap (NW), (d) twine 1 (T1), and (e) twine 2 (T2).

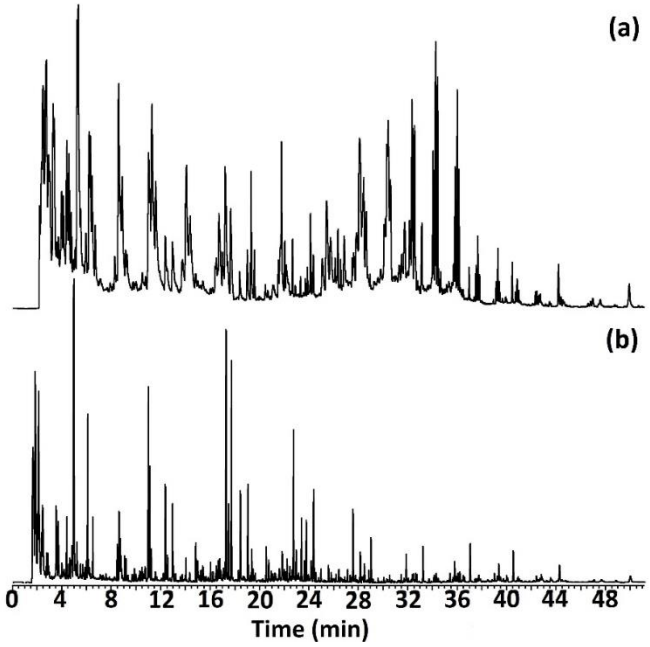

Figure S2. Py-GC-MS chromatograms at 500 °C of (a) bluegrass-mixed plastic (BMP) and (b) chaff-mixed plastic (CMP).

Table S1. Py-GC-MS products identified from chaff, bluegrass (BG), net wrap (NW), twine 1 (T1), twine 2 (T2), chaff mixed plastic (CMP), bluegrass mixed plastic (BMP) at 500 °C.

Compound Name	Formula	M^+ (m/z)	RT (min)	Chaff	BG	NW	T1	T2	CMP	BMP
							Area (%)			
Carbon dioxide	CO_2	44	1.58	3.14	11.21	4.28	-	-	0.81	0.99
Propene	C_3H_6	42	1.6	-	-	-	6.03	3.34	-	-
Cyclobutane	C_4H_8	56	1.63	-	-	-	-	-	-	1.3
Pentane	C_5H_{12}	72	1.77	-	-	4.1	6.03	3.24	2.62	-
Cyclopropyl carbinol	C_4H_8O	72	1.82	13.8	13.2	-	-	-	-	3.38
2-methyl-pentane	C_6H_{14}	86	1.97	-	-	-	1.17	-	-	-
Cyclohexane	C_6H_{12}	84	2.04	-	-	-	4.86	-	-	-
2-methyl-1-pentene	C_6H_{12}	84	2.05	-	-	4.94	-	2.26	-	4.77
Acetic acid	$C_2H_4O_2$	60	2.23	17.5	11.2	-	-	-	-	-
1-Hexene	C_6H_{12}	84	2.28	-	-	-	0.98	0.41	3.82	2.38
1-hydroxy-2-propanone,	$C_3H_6O_2$	74	2.34	13.1	7.94	-	-	-	1.38	-
(Z),(Z)-2,4-Hexadiene	C_6H_{10}	82	2.36	-	-	-	2.2	0.65	-	-
5-methyl-1-hexyne	C_7H_{12}	96	2.47	-	-	-	-	1.39	-	-
1-Heptene	C_7H_{14}	98	2.69	-	-	1.82	0.52	-	1.55	1.07
Propanoic acid	$C_3H_6O_2$	74	2.8	1.52	0.88	-	-	-	-	-
Heptane	C_7H_{16}	100	2.81	-	-	1.7	0.6	0.38	-	1.33
3-methyl-4-penten-1-ol	$C_6H_{12}O$	100	2.91	-	-	-	-	-	1.06	-
4-methyl-1-penten-3-ol	$C_6H_{12}O$	100	3.24	1.89	2.38	-	-	-	1	0.44
Toluene	C_7H_8	92	3.45	1.75	1.17	-	-	-	-	0.88
4-methyl-3-heptene	C_8H_{16}	112	3.47	-	-	-	1.63	0.72	1.26	-
1-(1,1-dimethylethyl)-2-methylene-cyclopropane,	C_8H_{14}	110	3.62	-	-	-	1.25	0.76	0.27	0.66
(Z)-3-Octene	C_8H_{16}	112	3.92	-	-	1.75	0.27	-	1.64	1.06
2-Cyclopenten-1-one	C_5H_6O	82	4.11	3.14	1.47	-	-	-	-	
Octane	C_8H_{18}	114	4.11	-	-	1.21	-	-	1.34	0.98
2,2-Dimethyl-3-heptene trans	C_9H_{18}	126	4.3	-	-	0.24	-	-	-	0.5
2,6-dimethyl-3-heptene	C_9H_{18}	126	4.32	-	-	-	1.23	0.57	0.58	-
Furfural	$C_5H_4O_2$	96	4.4	0.72	2.12	-	-	-	-	-
1,2,4-trimethyl-(1α,2β,4β)-cyclohexane	C_9H_{18}	126	4.54	-	-	-	0.4	-	0.33	-
1,3,5-trimethyl-cyclohexane	C_9H_{18}	126	4.67	-	-	-	0.41	-	-	0.29
2-Furanmethanol	$C_5H_6O_2$	98	4.7	1.12	3.19	-	-	-	-	-
4,4,5-trimethyl-2-hexene	C_9H_{18}	126	4.74	-	-	-	0.71	0.72	-	-
3-Furanmethanol	$C_5H_6O_2$	98	4.81	2.21	-	-	-	-	-	-
2,4-Dimethyl-1-heptene	C_9H_{18}	126	4.86	-	-	5.68	-	-	2.43	5.3
2,3-Dimethyl-3-heptene	C_9H_{18}	126	4.92	-	-	-	9.36	6.91	-	-
1,3,5-trimethyl-(1α,3α,5β)-cyclohexane,	C_9H_{18}	126	5.15	-	-	-	0.51	0.39	0.51	0.64
p-Xylene	C_8H_{10}	106	5.19	0.30	0.84	-	-	-	-	-
3,3,5-trimethyl-cyclohexene	C_9H_{16}	124	5.42	-	-	-	0.24	0.19	-	-
2-methyl-2-cyclopenten-1-one	C_6H_8O	96	5.57	0.86	1.16	-	-	-	-	-
Cyclononene	C_9H_{16}	124	5.61	-	-	0.6	0.27	0.14	-	0.25
Acetylfuran	$C_6H_6O_2$	110	5.78	0.36	0.43	-	-	-	-	-
1-Nonene	C_9H_{18}	126	5.99	-	-	1.84	0.28	-	2.62	-

Compound Name	Formula	M+ (m/z)	RT (min)	Chaff	BG	NW	T1	T2	CMP	BMP
				Area (%)						
Nonane	C_9H_{20}	128	5.86	-	-	0.89	-	-	1.14	0.81
1-Methylpentyl cyclopropane	C_9H_{18}	126	5.88	-	-	-	-	-	1.4	-
(E)-2-Nonene	C_9H_{18}	126	6.14	0.74	-	-	-	-	0.95	-
2-hydroxy-2-cyclopenten-1-one	$C_5H_6O_2$	98	6.29	1.65	2.58	-	-	-	0.45	-
2,6-dimethyl-(Z)-1,6-octadiene	$C_{10}H_{18}$	138	6.32	-	-	0.28	-	0.6	0.5	0.35
2,2-dimethyl-3-octene	$C_{10}H_{20}$	140	6.13	-	-	-	0.23	0.15	-	-
1,2,3,4,5-pentamethyl-cyclopentane	$C_{10}H_{20}$	140	6.41	-	-	0.66	2.76	1.47	-	1.83
1,9-Decadiene	$C_{10}H_{18}$	138	6.86	-	-	-	0.96	-	0.32	-
5-methyl-2-furaldehyde	$C_6H_6O_2$	110	7.99	3.61	4.5	-	-	-	-	0.26
Phenol	C_6H_6O	94	8.27	2.5	5.08	-	-	-	-	-
3-Heptenoic acid	$C_7H_{12}O_2$	128	8.36	0.72	-	-	-	-	-	-
1-Decene	$C_{10}H_{20}$	140	8.39	-	-	3.53	0.52	0.14	3.5	2.54
2-methyl-3-methylene-nonane	$C_{11}H_{22}$	154	8.54	-	-	0.23	0.98	0.7	-	-
4-methyl-(Z)-2-decene,	$C_{11}H_{22}$	154	8.63	-	-	-	0.6	0.38	-	-
7-methyl-(Z)-2-decene,	$C_{11}H_{22}$	154	8.69	-	-	1.12	0.28	0.24	-	1.04
3-methyl-1,2-cyclopentanedione	$C_6H_8O_2$	112	8.71	2.59	2.7	-	-	-	-	-
4,6,8-trimethyl-1-nonene	$C_{12}H_{24}$	168	8.75	-	-	-	0.14	0.12	1.44	-
2,3-dimethyl-2-cyclopenten-1-one	$C_7H_{10}O$	110	8.83	1.35	0.93	-	-	-	-	-
4-methyl-decane	$C_{11}H_{24}$	156	8.99	-	-	0.17	0.06	0.21	-	0.1
2,6-dimethyl-nonane	$C_{11}H_{24}$	156	9.01	-	-	-	0.35	0.21	-	-
Undecane	$C_{11}H_{24}$	156	9.13	-	-	-	0.32	0.12	0.32	0.09
Acetophenone	C_8H_8O	120	9.59	1.11	-	-	-	-	-	-
(Z)-6-Dodecene	$C_{12}H_{24}$	168	9.79	-	-	-	0.19	-	0.4	-
o-Cresol	C_7H_8O	108	9.8	0.91	1.75	-	-	-	-	-
(Z)-3-Dodecene	$C_{12}H_{24}$	168	9.91	-	-	-	0.11	-	0.21	-
Guaiacol	$C_7H_8O_2$	124	10.4	3.28	5.07	-	-	-	-	-
2,2-dimethyl-(E)-3-decene	$C_{12}H_{24}$	168	10.41	-	-	-	0.37	0.33	0.16	-
1-phenyl-1,2-butanediol	$C_{10}H_{14}O_2$	166	10.64	0.81	-	-	-	-	-	-
2,6,6-trimethyl-[1R-(1α,2α,5α)]-bicyclo[3.1.1]heptane,	$C_{10}H_{18}$	138	10.66	-	-	-	0.24	0.26	1.53	-
1,10-Undecadiene	$C_{11}H_{20}$	152	10.83	-	-	0.49	-	-	1.12	-
1,4-dimethyl-trans-cyclooctane	$C_{10}H_{20}$	140	10.89	-	-	0.68	3.15	2.42	3.45	1.41
8-methyl-1-decene	$C_{11}H_{22}$	154	11.01	-	-	0.41	1.64	1.38	1.93	-
3-ethyl-2-hydroxy-2-cyclopenten-1-one	$C_7H_{10}O_2$	126	11.13	0.27	1.23	-	-	-	-	-
(Z)-3-Undecene	$C_{11}H_{22}$	154	11.17	-	-	2.97	0.42	0.21	0.98	2.16
Dodecane	$C_{12}H_{26}$	170	11.48	-	-	1.34	-	-	2.63	-
3-ethyl-phenol	$C_8H_{10}O$	122	12.07	0.21	0.46	-	-	-	-	-
5,7-dimethyl-(R)-1,6-Octadiene	$C_{10}H_{18}$	138	12.13	-	-	-	0.13	0.17	1.93	-
1,2,3,4-tetrahydro-1,4-methanonaphthalen-9-one	$C_{11}H_{10}O$	158	12.2	0.17	-	-	-	-	-	-
5-methyl-1-undecene	$C_{12}H_{24}$	168	12.29	-	-	-	1.4	0.7	-	0.34
1,12-Tridecadiene	$C_{13}H_{24}$	180	12.28	-	-	0.31	0.35	1.08	-	-
2,6-dimethyl-phenol	$C_8H_{10}O$	122	12.37	0.82	0.97	-	-	-	-	-
1-Tridecene	$C_{13}H_{26}$	182	12.86	-	-	0.27	1.14	1.18	-	0.56
4-ethyl-phenol	$C_8H_{10}O$	122	12.93	0.78	1.4	-	-	-	-	-
2,5-dimethyl-(E)-1,6-octadiene	$C_{10}H_{18}$	138	12.94	-	-	-	0.22	0.28	-	-

Compound Name	Formula	M^+ (m/z)	RT (min)	Chaff	BG	NW	T1	T2	CMP	BMP
				Area (%)						
1-Isopropyl-1,4,5-trimethylcyclohexane	$C_{12}H_{24}$	168	13.11	-	-	-	0.14	0.14	-	-
Creosol	$C_8H_{10}O_2$	138	13.12	0.46	0.78	-	-	-	-	-
2-Decanone	$C_{10}H_{20}O$	156	13.46	0.3	-	-	-	-	-	0.34
1,13-Tetradecadiene	$C_{14}H_{26}$	194	13.63	-	-	0.64	0.17	0.13	-	-
Isocreosol	$C_8H_{10}O_3$	138	13.92	0.43	0.39	-	-	-	-	-
1-Tetradecene	$C_{14}H_{28}$	196	13.95	-	-	2.51	0.31	-	1.23	0.24
1,2-Benzenedimethanol	$C_8H_{10}O_2$	138	14.24	0.2	0.97	-	-	-	-	-
7-Tetradecene	$C_{14}H_{28}$	196	14.26	-	-	1.44	0.15	0.13	0.17	0.93
Tetradecane	$C_{14}H_{30}$	198	14.74	0.58	0.5	0.18	0.55	0.53	-	0.09
(Z)-5-Tetradecene	$C_{14}H_{28}$	196	14.92	-	-	-	0.36	0.4	-	-
1-Indanone	C_9H_8O	132	15.25	0.59	0.25	-	-	-	-	-
Ethylguaiacol	$C_9H_{12}O_2$	152	15.67	0.38	0.67	-	-	-	-	-
Vinylguaiacol	$C_9H_{10}O_2$	150	16.54	2.14	4.37	-	-	-	-	-
1-Pentadecyne	$C_{15}H_{28}$	208	16.57	-	-	0.86	0.37	0.46	0.53	-
4-Hydroxy-3-methylacetophenone	$C_9H_{10}O_2$	150	16.65	1.22	1.05	-	-	-	0.4	-
Pentadecadiene	$C_{15}H_{28}$	208	16.68	-	-	2.51	0.28	0.13	-	0.08
2-(2-butynyl)-Cyclohexanone	$C_{10}H_{14}O$	150	16.79	-	0.59	-	-	-	-	-
1-Pentadecene	$C_{15}H_{30}$	210	16.97	-	-	1.2	5.12	4.25	-	-
Pentadecane	$C_{15}H_{32}$	212	17.17	-	-	1.43	1.19	1.36	2.18	-
Syringol	$C_8H_{10}O_3$	154	17.28	-	0.54	-	-	-	0.43	0.97
1-Hexadecene	$C_{16}H_{32}$	224	17.61	-	-	0.91	3.94	3.33	1.38	-
3-Allyl-6-methoxyphenol	$C_{10}H_{12}O_2$	164	17.68	-	0.29	-	-	-	-	0.6
3,7-Dimethyl-2,6-nonadien-1-ol	$C_{11}H_{20}O$	168	18.02	0.1	-	-	-	-	-	-
(1-methyl-1-butenyl)-benzene	$C_{11}H_{14}$	146	18.2	0.14	0.27	-	-	-	-	-
3-(1-Ethoxyethoxy)-3-methyl-1-butene	$C_9H_{18}O_2$	158	18.33	0.26	0.27	-	-	-	0.27	0.14
6-allyl-guaiacol	$C_{10}H_{12}O_2$	164	18.99	0.15	0.29	-	-	-	0.55	0.16
(Z)-7-Hexadecene	$C_{16}H_{32}$	224	19	-	-	1.26	-	-	0.97	-
Cetene	$C_{16}H_{32}$	224	19.29	-	-	3.38	1.4	1.17	-	0.27
2-Methylpentadecane	$C_{16}H_{34}$	226	19.3	-	-	-	0.47	1.74	-	-
Hexadecane	$C_{16}H_{34}$	226	19.56	-	-	1.25	1.78	0.22	0.37	0.11
1,6Z,9Z-Heptadecatriene	$C_{17}H_{30}$	234	20.45	-	-	-	0.53	-	-	-
5-decyl-Bicyclo[2.2.1]hept-2-ene	$C_{17}H_{30}$	234	20.65	-	-	-	0.35	-	-	-
Isoeugenol	$C_{10}H_{12}O_2$	164	20.91	0.17	0.5	-	-	-	-	2.29
n-Heptadecadiene	$C_{17}H_{32}$	236	21.49	-	-	1.06	0.36	0.52	0.22	1.13
1-Heptadecene	$C_{17}H_{34}$	238	21.77	-	-	3.49	0.45	0.32	1.77	0.3
Heptadecane	$C_{17}H_{36}$	240	22.01	-	-	1.41	0.14	0.3	0.32	0.1
1,1'-(2-propyl-1,3-propanediyl)bis-cyclohexane	$C_{18}H_{34}$	250	22.14	-	-	-	0.29	0.43	0.51	-
Octadecadiene-1,17	$C_{18}H_{34}$	250	22.65	-	-	0.52	2.56	2.15	0.35	0.06
6-Tetradecanone	$C_{14}H_{28}O$	212	23.27	0.21	-	-	-	-	-	-
1-Octadecene	$C_{18}H_{36}$	252	23.69	-	-	0.22	1.01	0.78	0.1	0.29
Octadecane	$C_{18}H_{38}$	254	23.86	-	-	1.28	-	0.57	0.16	-
2-methyl-7-Octadecyne	$C_{19}H_{36}$	264	23.3	-	-	-	1.21	0.98	0.13	-
1,19-Eicosadiene	$C_{20}H_{38}$	278	24.11	-	-	3.06	0.41	0.22	0.48	-
2,6,10-trimethyl-tetradecane	$C_{17}H_{36}$	240	24.31	0.21	0.14	-	-	-	-	-

Compound Name	Formula	M+ (m/z)	RT (min)	Chaff	BG	NW	T1	T2	CMP	BMP
							Area (%)			
1-Eicosene	$C_{20}H_{40}$	280	24.47	-	-	0.34	1.82	1.65	0.12	-
(E)-3-Eicosene	$C_{20}H_{40}$	280	24.7	-	-	-	0.22	-	0.64	1.8
Eicosane	$C_{20}H_{42}$	282	24.88	-	-	1.55	0.29	0.2	1.61	3.36
2-dodecyl 1,3-propanediol	$C_{15}H_{32}O_2$	144	25.75	0.13	-	-	-	-	-	-
2-methyl-1-Hexadecanol	$C_{17}H_{36}O$	256	25.97	0.12	-	-	-	-	-	-
2-Pentadecanone	$C1_5H_{30}O$	226	26.08	0.11	-	-	-	-	-	0.29
9-Nonadecene	$C_{19}H_{38}$	266	26.3	0.21	0.26	-	0.46	-	-	-
3Z,6Z-Heneicosadiene	$C_{21}H_{40}$	292	26.33	-	-	-	0.22	-	0.13	-
6Z,9Z-Heneicosadiene	$C_{21}H_{40}$	292	26.32	-	-	0.86	0.21	0.38	0.77	-
1-Heneicosene	$C_{21}H_{42}$	294	26.5	-	-	1.76	1.16	0.57	0.16	0.97
Nonadecane	$C_{19}H_{40}$	268	26.53	0.17	0.11	-	-	-	-	-
Heneicosane	$C_{21}H_{44}$	296	26.55	0.11	-	0.88	0.68	0.65	0.18	4.45
3,7,11-trimethyl-1-Dodecanol	$C_{15}H_{32}O$	228	27.19	0.32	0.61	-	-	-	0.43	-
Tetradecanoic acid	$C_{14}H_{28}O_2$	228	27.48	0.36	-	-	-	-	0.82	-
1-Dodecyl-decahydronaphthalin	$C_{22}H_{42}$	306	28.23	-	-	0.44	0.08	0.37	2.86	1.81
1-Octadecanol	$C_{18}H_{38}O$	270	28.39	0.07	-	-	-	-	-	1.57
1,21-Docosadiene	$C_{22}H_{42}$	306	28.44	-	-	1.15	0.39	0.33	1.54	2.55
1-Docosene	$C_{22}H_{44}$	308	28.64	-	-	0.43	0.2	0.5	0.82	-
Docosane	$C_{22}H_{46}$	310	28.95	-	-	0.2	0.7	0.63	0.11	-
7-Octyloxepan-2-one	$C_{14}H_{26}O_2$	226	29.34	0.12	-	-	-	-	0.38	0.4
7-Tricosene	$C_{23}H_{46}$	322	30.25	-		0.34	0.08	0.53	0.7	1.29
2-Heptadecanone	$C_{17}H_{34}O$	254	30.26	0.58	-	-	-	-	-	1.57
1-Nonadecene	$C_{19}H_{38}$	266	30.43	0.08	-	-	-	-	-	-
1-Tricosene	$C_{23}H_{46}$	322	30.46	-	-	0.95	0.11	0.34	3.02	3.54
Tricosane	$C_{23}H_{48}$	324	30.65	-	-	0.41	0.03	0.81	1.33	1.91
Methyl-hexadecanoate	$C_{17}H_{34}O_2$	270	30.78	0.05	-	-	-	-	-	0.51
n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	31.47	0.26	-	-	-	-	0.25	0.64
1-Tetracosyne	$C_{24}H_{46}$	334	31.79	-	-	0.1	0.06	-	0.85	2.17
7Z-Tetracosene	$C_{24}H_{48}$	336	31.8	-	-	-	0.41	0.33	0.35	-
9Z-Tetracosene	$C_{24}H_{48}$	336	32.2	-	-	0.4	0.15	0.76	-	1.42
n-Eicosanol	$C_{20}H_{42}O$	298	32.35	0.14	-	-	-	-	0.33	-
1-Tetracosene	$C_{24}H_{48}$	336	32.38	-	-	0.96	0.15	0.74	2.08	2.89
Tetracosane	$C_{24}H_{50}$	338	32.56	-	-	0.46	0.13	0.51	1.54	1.95
6,9-Pentacosadiene	$C_{25}H_{48}$	348	34.05	-	-	0.45	0.61	1.23	0.23	0.3
7Z,17Z-Pentacosadiene	$C_{25}H_{48}$	348	33.64	-	-	-	0.07	0.61	-	1.45
9-Pentacosene	$C_{25}H_{50}$	350	34.22	-	-	0.99	0.14	1.13	2.36	1.7
2-Methyltetracosane	$C_{25}H_{52}$	352	34.38	-	-	0.43	0.08	0.73	1.52	1.04
9-dodecyltetradecahydro-phenanthrene,	$C_{26}H_{48}$	360	35.71	-	-	0.07	0.36	1.43	0.18	0.16
9,10-Hexacosadiene	$C_{26}H_{50}$	362	35.82	-	-	0.46	0.11	0.78	0.75	0.5
1-Hexacosene	$C_{26}H_{52}$	364	35.98	-	-	1.01	0.17	1.27	1.39	1.09
Heptacosadiene	$C_{27}H_{52}$	376	36.13	-	-	0.48	0.19	1.03	0.78	-
1-Heptacosene	$C_{27}H_{54}$	378	36.41	-	-	0.06	0.09	0.61	-	0.58
Heptacosane	$C_{27}H_{56}$	380	36.97	-	-	0.14	0.63	2.33	0.23	0.23
1,3,5-trimethyl-2-octadecyl-Cyclohexane	$C_{27}H_{54}$	378	37.38	-	-	-	0.07	0.36	-	-

Compound Name	Formula	M^+ (m/z)	RT (min)	Chaff	BG	NW	T1	T2	CMP	BMP
						Area (%)				
Octacosadiene	$C_{28}H_{58}$	390	37.52	-	-	0.46	0.06	0.43	0.25	0.24
1-Octacosene	$C_{28}H_{58}$	392	37.67	-	-	0.96	-	0.54	0.4	0.46
Octacosane	$C_{28}H_{58}$	394	37.82	-	-	0.45	0.12	0.2	0.18	0.2
9Z,19Z-Nonacosadiene	$C_{29}H_{56}$	404	37.98	-	-	-	0.02	0.49	-	0.14
Nonacosadiene	$C_{29}H_{56}$	404	39.16	-	-	0.41	0.11	0.44	0.02	0.33
1-Nonacosene	$C_{29}H_{58}$	406	39.29	-	-	0.9	0.36	1.18	0.32	-
Nonacosane	$C_{29}H_{60}$	408	39.43	-	-	0.39	0.13	0.47	0.13	0.12
Hexahydrosqualene	$C_{30}H_{56}$	416	39.66	-	-	-	0.06	0.25	0.05	-
Octahydro-squalene	$C_{30}H_{58}$	416	39.92	-	-	-	0.10	0.39	0.05	-
7,25-Tricontadiene	$C_{30}H_{58}$	416	40.01	-	-	-	0.06	0.18	0.03	-
Triacontine	$C_{30}H_{58}$	416	40.45	-	-	0.12	0.57	1.69	0.24	0.13
Triacontadiene	$C_{30}H_{60}$	418	40.72	-	-	0.34	-	0.14	0.06	0.09
1-Triacontene	$C_{30}H6_{0}$	420	40.85	-	-	0.75	0.10	0.47	0.15	0.2
Triacontane	$C_{30}H_{62}$	422	40.98	-	-	0.38	0.06	0.29	0.1	0.12
Hentriaconta-1,3-diene	$C_{31}H_{60}$	432	42.33	-	-	0.3	0.13	0.34	0.11	0.09
1-Hentriacontene	$C_{31}H_{62}$	434	42.47	-	-	0.62	0.05	0.17	0.1	0.13
Hentriacontane	$C_{31}H_{64}$	436	42.61	-	-	0.32	0.18	0.22	0.09	0.08
Dotriacontadiene	$C_{32}H_{62}$	446	44.24	-	-	0.26	0.45	1.04	0.37	0.16
1-Dotriacontene	$C_{32}H_{64}$	448	44.41	-	-	0.49	-	0.16	0.08	0.09
Dotriacontane	$C_{32}H_{66}$	450	44.58	-	-	0.26	-	0.12	0.05	0.06
Tritriacontadiene	$C_{33}H_{64}$	460	46.6	-	-	0.13	-	0.11	-	0.08
1-Tritriacontene	$C_{33}H_{66}$	462	46.81	-	-	0.29	-	0.23	-	-
Tritriacontane	$C_{33}H_{68}$	464	47.02	-	-	0.17	-	-	0.04	-
1-Tetratriacontene	$C_{34}H_{68}$	476	49.56	-	-	0.11	-	0.27	-	-
1-Pentatriacontene	$C_{35}H_{70}$	490	49.83	-	-	0.23	-	0.21	-	-
Pentatriacontane	$C_{35}H_{72}$	492	50.07	-	-	0.11	-	0.87	-	-

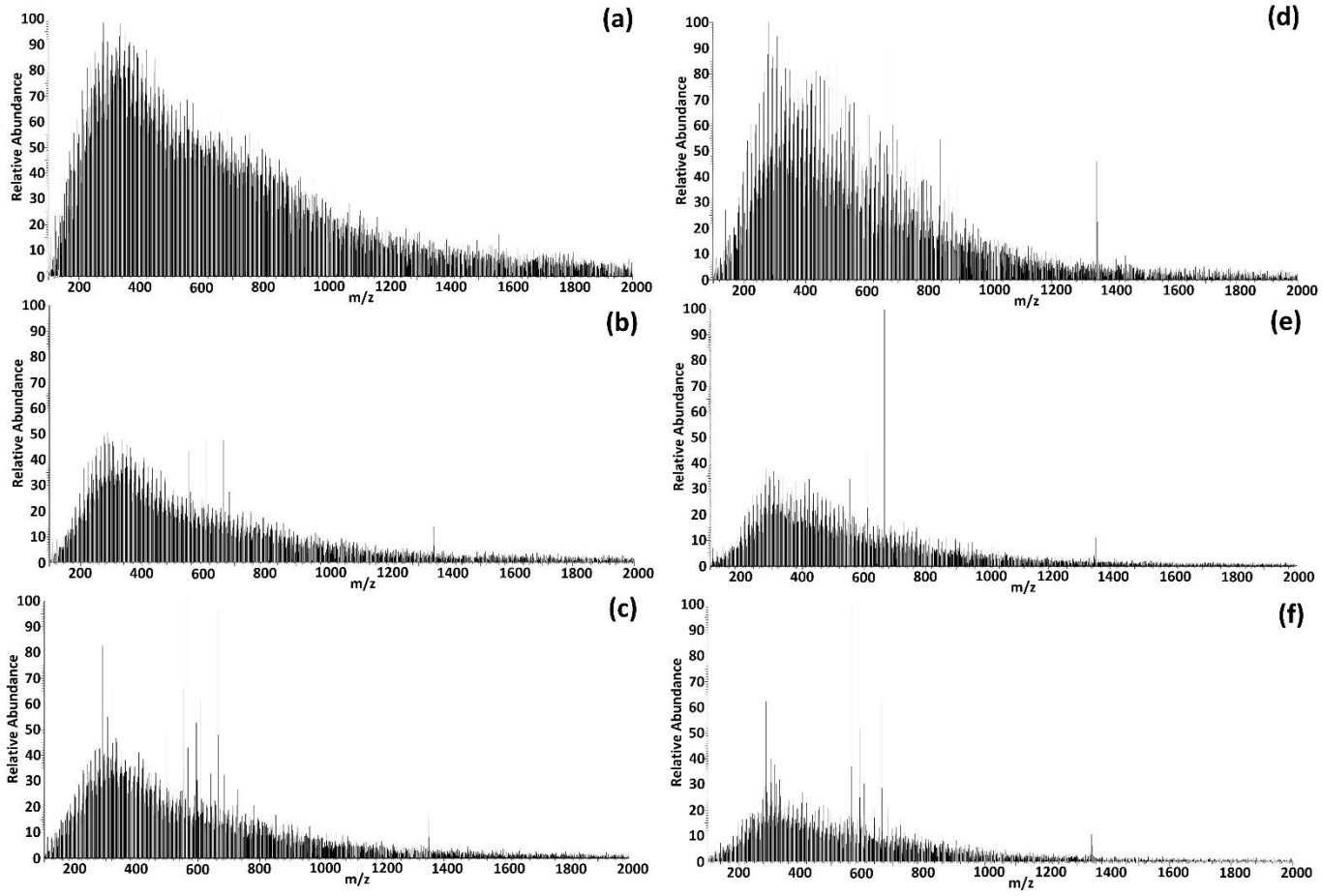

Figure S3. Positive-ion ESI-MS spectra of the products of liquid products of catalytic pyrolysis of bluegrass-mixed plastic (BMP) at (a) 500 °C, (b) 550 °C, and (c) 600 °C and chaff-mixed plastic (CMP) at (d) 500 °C, (e) 550 °C, and (f) 600 °C.

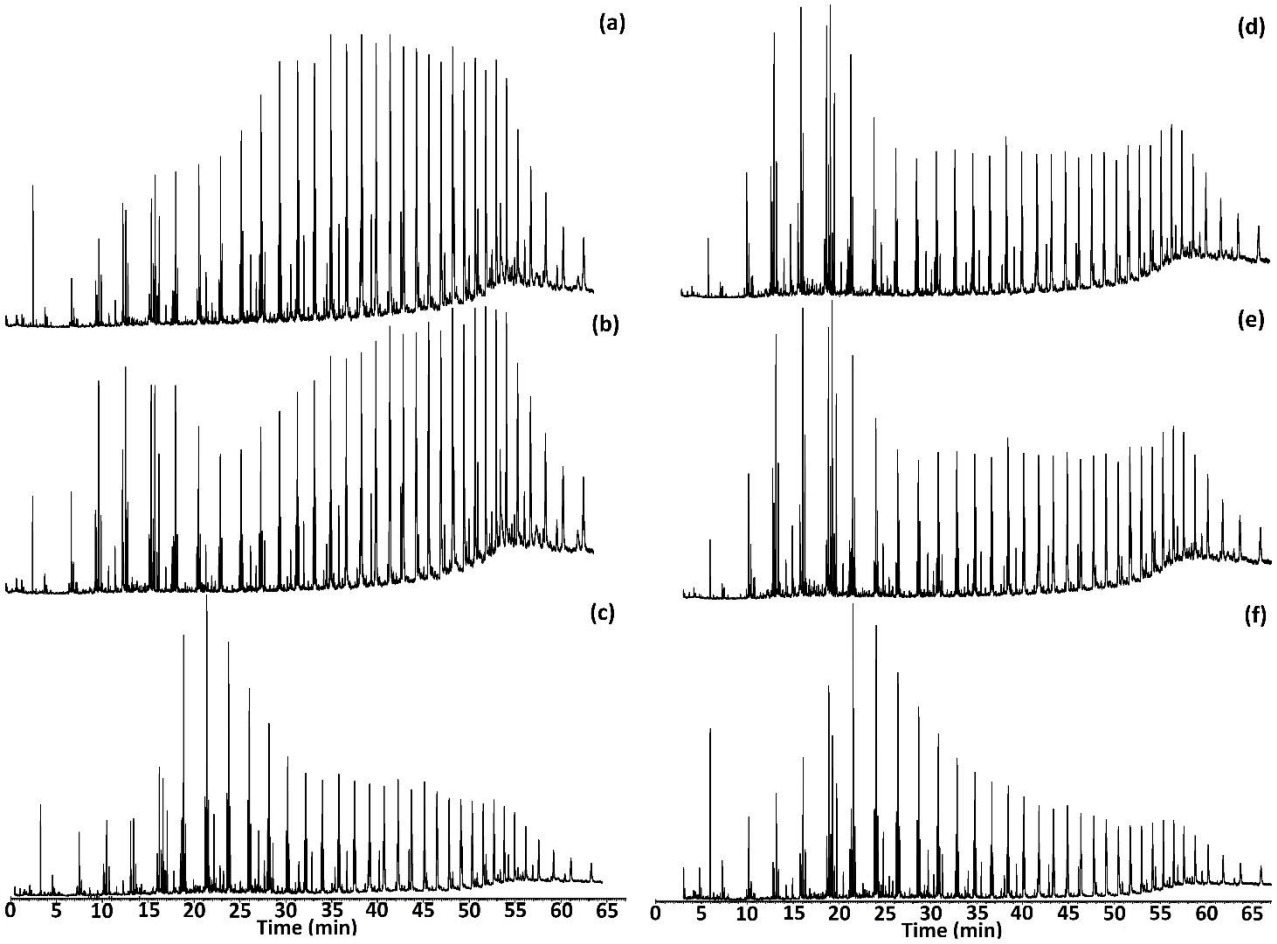

Figure S4. GC-MS chromatograms of liquid products collected in U-tube condenser from thermal pyrolysis of BMP at (a) 500 °C, (b) 550 °C, and (c), 600 °C and CMP at (d) 500 °C, (e) 550 °C, and (f) 600 °C.

Table S2. Identified compounds in the liquid products of thermal pyrolysis of BMP and CMP at 500, 550, and 600 °C collected from the condenser. The units are mg compound per g resultant liquid product.

Compound Name	Formula	M^+ (m/z)	RT	BMP500	BMP550	BMP600	CMP500	CMP550	CMP600
			Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
1-Heptene	C_7H_{14}	98	3.05	1.16	0.64	1.37	0.15	2.63	4.83
Heptane	C_7H_{16}	100	3.16	0.74	0.36	-	-	1.70	1.68
methyl-Cyclohexane	C_7H_{14}	98	3.52	-	-	-	-	0.36	0.59
Glycerol	$C_3H_8O_3$	92	3.69	-	-	0.69	-	0.46	0.49
2,2-Dimethoxybutane	$C_6H_{14}O_2$	118	4.18	0.81	0.68	0.84	0.58	1.28	1.69
4-methyl-Heptane	C_8H_{18}	114	4.27	-	-	-	-	1.34	0.99
2-methyl-1-Heptene	C_8H_{16}	112	4.68	-	-	-	-	0.73	0.69
2-cyclopropyl-Pentane	C_8H_{16}	112	4.7	-	-	-	0.25	4.01	4.73
1-Octene	C_8H_{16}	112	4.77	0.92	0.81	1.19	-	-	-
3-ethyl-Hexane	C_8H_{18}	114	4.95	0.70	0.58	0.65	-	1.95	1.69
2,4-Dimethyl-1-heptene	C_9H_{18}	126	5.95	10.9	5.38	9.47	4.18	36.4	27.8
1,2,4-trimethyl-trans,cis-Cyclohexane	C_9H_{18}	126	6.31	0.68	0.26	0.47	0.23	1.76	1.04
3,3,5-trimethyl-Cyclohexene	C_9H_{16}	124	6.72	-	-	-	-	0.92	0.90
1,8-Nonadiene	C_9H_{16}	124	7.02	-	-	-	-	0.77	0.92
1-Nonene	C_9H_{18}	126	7.26	1.53	1.18	2.01	1.15	2.50	2.66
3-Ethyl-4-methylpentan-1-ol	$C_8H_{18}O$	130	7.32	0.89	0.65	1.01	0.71	5.59	6.11
Nonane	C_9H_{20}	128	7.5	0.95	0.59	1.00	0.90	2.91	2.47
2,6-dimethyl-1,6-Octadiene	$C_{10}H_{18}$	38	7.91	0.38	0.20	-	0.32	0.99	0.75
1,9-Decadiene	$C_{10}H_{18}$	138	9.2	-	-	-	0.36	0.33	0.19
Bicyclo[7.1.0]-decane	$C_{10}H_{18}$	138	9.92	0.33	0.57	0.65	0.78	1.26	1.69
Phenol	C_6H_6O	94	9.98	0.47	0.89	1.06	-	-	-
4-methyl-Nonane	$C_{10}H_{22}$	142	10.1	-	-		10.10	10.92	
1-Decene	$C_{10}H_{20}$	140	10.2	3.66	5.64	6.00	0.89	1.08	15.41
(3-methylbutyl)-Cyclopentane	$C_{10}H_{20}$	140	10.3	-	0.60	0.55	4.20	2.87	1.87
Decane	$C_{10}H_{22}$	142	10.4	1.29	1.55	1.45	-	-	3.20
5-ethyl-2-methyl-Heptane	$C_{10}H_{22}$	142	10.7	0.57	0.73	0.70	1.92	1.26	1.37
3,3-dimethyl-Octane	$C_{10}H_{22}$	142	10.8	0.67	0.87	0.63	2.11	1.13	1.39
3-methyl-1,2-Cyclopentanedione	C_6H8O_2	112	11.3	-	-	1.08	-	0.24	-
3-pentyl-(2Z)-2,4-Pentadien-1-ol	$C_{10}H_{18}O$	154	12.2	-	-	-	-	0.32	-
2,6,6-trimethyl-(1α,2α,5α)-Bicyclo[3.1.1]heptan-3-one	$C_{10}H_{16}O$	152	12.3	-	-	-	0.66	0.27	-
4-ethyl-1,2-dimethyl-Benzene	$C_{10}H_{14}$	134	12.8	3.55	4.81	3.68	11.3	4.80	6.93
(E)-2-Decen-1-ol	$C_{10}H_{20}O$	156	12.9	2.54	4.38	2.39	9.17	4.44	7.32
1-Undecene	$C_{11}H_{22}$	154	13.2	6.95	12.6	7.52	22.6	11.0	20.4
(Z)-4-Undecene	$C_{11}H_{22}$	154	13.4	3.91	4.51	3.30	12.3	4.42	5.53
Undecane	$C_{11}H_{24}$	156	13.6	0.43	0.67	0.33	1.40	0.58	0.77
(2,4,6-Trimethylcyclohexyl) methanol	$C_{10}H_{20}O$	156	14.4	-	0.77	-	1.75	1.33	2.82
4,8-dimethyl-1,7-Nonadiene	$C_{11}H_{20}$	138	14.9	1.98	3.38	1.54	6.77	2.19	4.28
2-Isopropenyl-5-methylhex-4-enal	$C_{10}H_{16}O$	152	15.01	0.62	0.82	0.41	2.02	0.50	0.93
1-Isopropyl-1,4,5-trimethylcyclohexane	$C_{12}H_{24}$	168	15.2	-	-	-	1.15	0.25	-
1,11-Dodecadiene	$C_{12}H_{22}$	166	15.8	1.45	2.90	1.92	4.52	1.80	6.31
1-Dodecene	$C_{12}H_{24}$	168	16.1	9.27	13.6	7.48	25.8	10.3	27.5

Compound Name	Formula	M^+ (m/z)	RT	BMP500	BMP550	BMP600	CMP500	CMP550	CMP600
			Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
(E)-3-Decen-1-ol	$C_{10}H_{20}O$	156	16.2	-	-	-	1.34	4.98	9.26
Dodecane	$C_{12}H_{26}$	170	16.3	4.75	5.41	2.99	14.1	0.43	1.33
1-butyl-2-propyl-Cyclopentane	$C_{12}H_{24}$	168	16.4	0.67	0.81	1.75	1.58	0.29	2.14
(1,2-dimethylpropyl)-Cyclohexane	$C_{11}H_{22}$	154	16.8	0.71	0.88	0.83	1.35	0.62	-
2,3-dihydro-Benzofuran	C_8H_8O	120	16.9	0.53	0.70	1.21	0.71	0.31	1.55
4,6,8-trimethyl-1-Nonene	$C_{12}H_{24}$	168	17.3	-	-	-	1.37	0.25	1.05
2,6,7-trimethyl-Decane	$C_{13}H_{28}$	184	17.3	0.65	0.40	0.49	0.33	0.39	1.91
1-Ethyl-2,2,6-trimethylcyclohexane	$C_{11}H_{22}$	154	18.2	-	0.64	1.20	1.24	0.50	2.03
8-Dodecenol	$C_{12}H_{24}O$	152	18.7	2.25	3.50	3.85	4.50	2.36	12.7
Hydroquinone	$C_6H_6O_2$	110	18.7	1.42	1.36	1.14	2.49	1.21	4.13
1-Tridecene	$C_{13}H_{26}$	182	18.9	9.46	12.3	12.2	23.1	11.2	41.6
Tridecane	$C_{13}H_{28}$	184	19.1	4.36	4.57	4.31	11.2	4.90	11.7
2-butyl-1-Octanol	$C_{12}H_{26}O$	186	19.3	12.2	13.0	12.0	28.4	12.3	32.3
1-Dodecanol	$C_{12}H_{26}O$	186	19.5	2.99	2.92	2.92	7.19	2.81	7.98
5-methyl-2-(1-methylethyl)-1-Hexanol-acetate	$C_{12}H_{24}O_2$	200	19.7	8.34	8.57	8.97	19.3	8.14	22.6
2-Methyl-1-undecanol	$C_{12}H_{26}O$	186	20.5	-	1.70	2.37	3.66	1.64	5.41
1,14-Tetradecanediol	$C_{14}H_{30}O_2$	230	21.1	2.90	2.84	4.19	5.37	2.87	10.9
1,13-Tetradecadiene	$C_{14}H_{26}$	194	21.3	3.14	4.09	7.79	22.0	15.5	20.0
1-Tetradecene	$C_{14}H_{28}$	196	21.5	11.8	12.7	25.6	1.44		60.7
Tetradecane	$C_{14}H_{30}$	198	21.6	21.7	1.03	1.32	9.12	4.68	4.29
E-10-Pentadecenol	$C_{15}H_{30}O$	226	21.7	4.39	3.66	7.10	1.03	0.66	15.1
(Z)-11-Hexadecen-1-ol	$C_{16}H_{32}O$	240	23.9	3.14	3.00	10.1	4.13	4.30	19.1
1-Hexadecanol	$C_{16}H_{34}O$	242	24.1	12.1	10.4	30.5	16.8	15.4	58.9
1-Pentadecene	$C_{15}H_{30}$	210	24.2	5.49	3.73	9.46	8.49	5.82	17.7
2-ethyl-trans-1,1'-Bicyclohexyl	$C_{14}H_{26}$	194	24.4	-	1.15	3.63	-	-	6.00
Pentadecane	$C_{15}H_{32}$	212	24.6	0.75	0.77	2.25	1.11	1.04	3.89
2-Hexyl-1-decanol	$C_{16}H_{34}O$	242	24.8	4.12	2.98	9.84	4.70	5.13	17.1
2-Hexyl-1-octanol	$C_{14}H_{30}O$	214	25.5	2.16	1.63	3.99	2.43	2.17	6.80
3,7,11-trimethyl-1-Dodecanol	$C_{15}H_{32}O$	228	25.8	0.99	0.84	2.45	1.02	0.99	5.28
Hexadecadiene	$C_{16}H_30$	222	26.2	4.48	3.13	11.3	3.91	4.78	18.4
1-Hexadecene	$C_{16}H_{32}$	224	26.4	16.9	8.89	25.6	13.5	14.5	44.6
hexadecyl-Oxirane	$C_{18}H_{36}O$	268	26.5	-	2.68	6.80	4.22	3.71	12.8
Hexadecane	$C_{16}H_{34}$	226	26.6	6.06	2.97	8.65	6.87	6.31	14.1
9-Hexadecenoic acid	$C_{16}H_{30}O_2$	254	27.1	0.86	0.71	1.34	0.81	0.63	-
n-Heptadecadiene	$C_{17}H_{32}$	236	28.5	4.56	3.34	9.10	3.69	5.70	17.7
1-Heptadecene	$C_{17}H_{34}$	238	28.7	15.3	9.28	21.5	13.4	16.2	38.7
Heptadecane	$C_{17}H_{36}$	240	28.8	7.43	3.91	7.44	7.39	7.39	12.6
2-methyl-1-Hexadecanol	$C_{17}H_{36}O$	256	29.7	5.82	3.35	7.02	4.74	5.81	10.9
4-Hexyldecan-1-ol	$C_{16}H_{34}O$	242	30.3	4.24	2.60	4.49	3.51	3.61	6.31
9,12-Octadecadiene	$C_{18}H_{34}$	250	30.7	6.72	4.63	8.98	4.45	6.44	16.4
1-Octadecene	$C_{18}H_{36}$	252	30.8	17.6	10.7	17.2	14.2	17.6	34.5
Octadecane	$C_{18}H_{38}$	254	30.9	8.98	4.54	7.11	8.04	7.85	11.2
Cyclododecanemethanol	$C_{13}H_{26}O$	198	31.3	6.28	3.17	5.27	3.88	4.59	9.09
8,11-Nonadecadiene	$C_{19}H_{36}$	264	32.7	6.12	4.59	6.41	3.83	6.40	14.1

Compound Name	Formula	M^+ (m/z)	RT	BMP500	BMP550	BMP600	CMP500	CMP550	CMP600
			Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
1-Nonadecene	$C_{19}H_{38}$	266	32.9	19.8	11.7	14.3	14.4	19.0	29.4
Nonadecane	$C_{19}H_{40}$	268	32.9	10.0	5.19	5.92	8.81	8.85	10.7
2-(9-octadecenyloxy)-(Z)-Ethanol	$C_{20}H_{40}O_2$	312	33.7	1.85	1.10	1.66	1.09	1.36	3.25
1,19-Eicosadiene	$C_{20}H_{38}$	278	34.6	2.23	1.49	1.92	1.55	1.72	2.76
(E)-3-Eicosene	$C_{20}H_{40}$	280	34.7	6.50	5.13	5.49	3.78	6.61	12.2
1-Eicosene	$C_{20}H_{40}$	280	34.8	20.5	12.9	12.2	14.1	18.5	26.6
Eicosane	$C_{20}H_{42}$	282	34.9	11.9	6.68	6.18	9.54	10.3	12.0
1-Eicosanol	$C_{20}H_{42}O$	298	35.5	7.49	4.93	4.61	5.23	7.16	8.60
1-(ethenyloxy)-Octadecane	$C_{20}H_{40}O$	296	35.9	1.26	0.63	-	-	-	-
Heneicosadiene	$C_{21}H_{40}$	292	36.7	7.42	5.48	5.65	3.93	7.47	11.9
1-Heneicosene	$C_{21}H_{42}$	294	36.7	20.7	13.3	11.2	14.6	19.2	23.7
10-Heneicosene (c,t)	$C_{21}H_{42}$	294	36.8	10.7	5.46	4.73	8.90	9.05	9.61
Heneicosane	$C_{21}H_{44}$	296	36.9	1.58	0.56	-	-	-	-
cis-13-Docosenoic acid	$C_{22}H_{42}O_2$	338	37.7	1.99	1.59	1.32	1.12	1.59	2.19
Behenic alcohol	$C_{22}H_{46}O$	326	38.1	4.63	3.64	2.65	3.21	4.49	5.15
Docosadiene	$C_{22}H_{42}$	306	38.4	7.14	6.18	5.38	4.09	7.10	11.3
1-Docosene	$C_{22}H_{44}$	308	38.5	23.8	15.2	12.6	15.7	21.0	24.9
Docosane	$C_{22}H_{46}$	310	38.5	11.3	7.11	5.04	8.68	9.81	9.47
Phytol	$C_{20}H_{40}O$	296	39.4	9.39	6.37	5.34	1.70	7.84	8.35
11,13-Dimethyl-12-tetradecenyl acetate	$C_{18}H_{34}O_2$	282	39.7	1.46	0.83	0.69	0.74	0.95	1.61
Tricosadiene	$C_{23}H_{44}$	320	40.1	7.87	6.42	5.61	4.61	8.19	10.30
1-Tricosene	$C_{23}H_{46}$	322	40.2	21.1	14.1	11.2	15.2	19.4	22.0
Tricosane	$C_{23}H_{48}$	324	40.2	12.0	6.47	5.12	9.57	10.3	8.45
Tetracosa-1,3,5-triene	$C_{24}H_{44}$	332	41.6	3.94	3.71	2.31	2.61	3.63	3.94
Tetracosadiene	$C_{24}H_{46}$	334	41.7	7.34	5.25	4.72	3.73	7.49	10.5
1-Tetracosene	$C_{24}H_{48}$	336	41.8	22.2	16.6	11.9	14.8	19.0	17.8
Tetracosane	$C_{24}H_{50}$	338	41.9	11.4	6.96	5.14	8.88	10.0	8.37
Pentacosanal	$C_{25}H_{50}O$	366	42.8	8.96	6.63	4.78	5.73	7.94	8.13
1-cyclopentyl-4-(3-cyclopentylpropyl)-Dodecane	$C_{25}H_{48}$	348	43.23	1.51	0.98	0.83	0.74	1.21	1.34
6,9-Pentacosadiene	$C_{25}H_{48}$	348	43.3	7.41	6.17	5.97	3.76	7.76	8.24
9-Pentacosene	$C_{25}H_{50}$	350	43.4	22.6	17.2	11.8	13.1	19.7	18.7
Pentacosane	$C_{25}H_{52}$	352	43.5	15.0	9.11	6.68	10.8	10.7	9.20
Hexacosa-1,3-diene	$C_{26}H_{50}$	362	44.8	7.43	6.23	5.23	3.32	1.74	2.57
1-Hexacosene	$C_{26}H_{52}$	364	44.9	23.4	17.6	12.6	14.5	6.52	9.36
Hexacosane	$C_{26}H_{54}$	366	44.9	19.8	13.1	8.55	12.3	19.5	18.9
2'-dodecyl-1,1':3',1''-Tercyclopentane	$C_{27}H_{50}$	374	45.6	9.37	6.92	0.80	6.03	15.3	11.4
Heptacosadiene	$C_{27}H_{52}$	376	46.3	6.12	6.17	5.30	3.00	6.79	6.29
1-Heptacosene	$C_{27}H_{54}$	378	46.4	20.6	14.2	11.9	13.7	19.9	18.5
Heptacosane	$C_{27}H_{56}$	380	46.4	18.0	11.6	7.45	10.5	12.8	9.96
1-Octacosene	$C_{28}H_{56}$	392	47.8	32.7	25.3	19.1	18.7	24.0	25.0
Octacosane	$C_{28}H_{58}$	394	47.8	14.4	11.1	6.80	11.8	12.4	8.97
1-Heptacosanol	$C_{27}H_{56}O$	396	48.1	3.91	3.35	2.34	2.67	4.09	3.87
Octacosanol	$C_{28}H_{58}O$	410	48.6	1.68	0.97	0.85	7.50	9.97	12.1
7-Nonacosene	$C_{29}H_{58}$	406	49.1	-	-	10.3	14.4	20.5	29.7

Compound Name	Formula	M^+ (m/z)	RT	BMP500	BMP550	BMP600	CMP500	CMP550	CMP600
			Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
1-Nonacosene	$C_{29}H_{58}$	406	49.2	55.7	29.0	12.8	11.7	12.6	10.2
Nonacosane	$C_{29}H_{60}$	408	49. 2	-	-	8.26	3.36	34.9	31.5
1-Triacontene	$C_{30}H_{60}$	420	50.5	50.8	35.6	25.5	17.0	2.97	2.97
Triacontane	$C_{30}H_{62}$	422	50.6	-	2.71	1.83	11.1	-	-
Docosyl octyl ether	$C_{30}H_{62}O$	438	50.9	6.99	4.76	2.75	3.71	5.60	4.63
1-Hentriacontene	$C_{31}H_{62}$	436	51.7	46.0	36.9	28.9	31.1	33.8	31.7
Hentriacontane	$C_{31}H_{64}$	436	51.9	15.2	12.0	9.92	7.64	9.81	8.28
13-Methyl-1-hentriacontene	$C_{32}H_{64}$	448	52.9	46.8	38.5	27.3	30.7	33.5	30.8
1,1,3,6-tetramethyl-2-(3,6,10,13,14-pentamethyl-3-ethyl-pentadecyl)cyclohexane	$C_{32}H_{64}$	448	53.3	4.52	2.59	1.64	1.18	2.59	1.96
Dotriacontane	$C_{32}H_{66}$	450	53.5	6.33	5.18	3.10	3.27	3.86	4.05
1-Tritriacontene	$C_{33}H_{66}$	462	54.2	43.0	34.8	25.1	27.2	31.0	28.4
Tritriacontane	$C_{33}H_{68}$	464	54.5	10.9	10.5	6.72	6.41	8.07	6.61
1-Tetratriacontene	$C_{34}H_{68}$	476	55.4	41.5	32.1	23.5	26.5	28.0	27.3
Tetratriacontane	$C_{34}H_{70}$	478	56.1	5.47	4.87	2.94	3.92	2.60	3.27
17-Pentatriacontene	$C_{35}H_{70}$	490	56.5	38.8	31.7	22.9	27.2	28.6	25.4
Pentatriacontane	$C_{35}H_{72}$	492	56.9	22.5	20.8	7.02	5.58	7.39	5.59
9,27-Hexatriacontadiene	$C_{36}H_{70}$	502	57.6	40.4	31.3	22.7	21.7	25.4	25.5
1-Hexatriacontene	$C_{36}H_{72}$	505	57.9	2.86	2.16	3.83	1.75	2.02	3.48
Hexatriacontane	$C_{36}H_{74}$	507	58.5	6.08	4.44	3.25	3.64	2.97	3.78
3,17-Dimethyl-1-pentatriacontene	$C_{37}H_{74}$	519	58.8	32.6	25.9	19.6	18.7	23.3	21.5
Heptatriacontane	$C_{37}H_{76}$	521	59.6	8.36	8.24	5.68	4.02	5.75	5.36
1-Octatriacontene	$C_{38}H_{76}$	533	60.3	31.7	26.1	19.0	20.9	19.7	20.3
Octatriacontane	$C_{38}H_{78}$	535	60.9	-	2.42	9.46	-	-	-
1-Tetracontene	$C_{40}H_{80}$	561	61.6	3.78	3.11	2.79	-	-	-
Tetracontane	$C_{40}H_{82}$	563	61.9	25.7	18.7	16.9	13.3	17.1	15.6
1-Dotetracontene	$C_{42}H_{84}$	589	63.1	5.74	5.09	3.48	2.47	3.73	3.64
15-Methylhentetracontane	$C_{42}H_{86}$	591	63.4	20.4	17.2	13.7	12.4	13.4	14.7
1-Tetratetracontene	$C_{44}H_{88}$	617	65.4	-	-	8.60	-	-	-
Tetratetracontane	$C_{44}H_{90}$	619	65.9	24.1	17.7	15.9	13.7	13.5	13.0

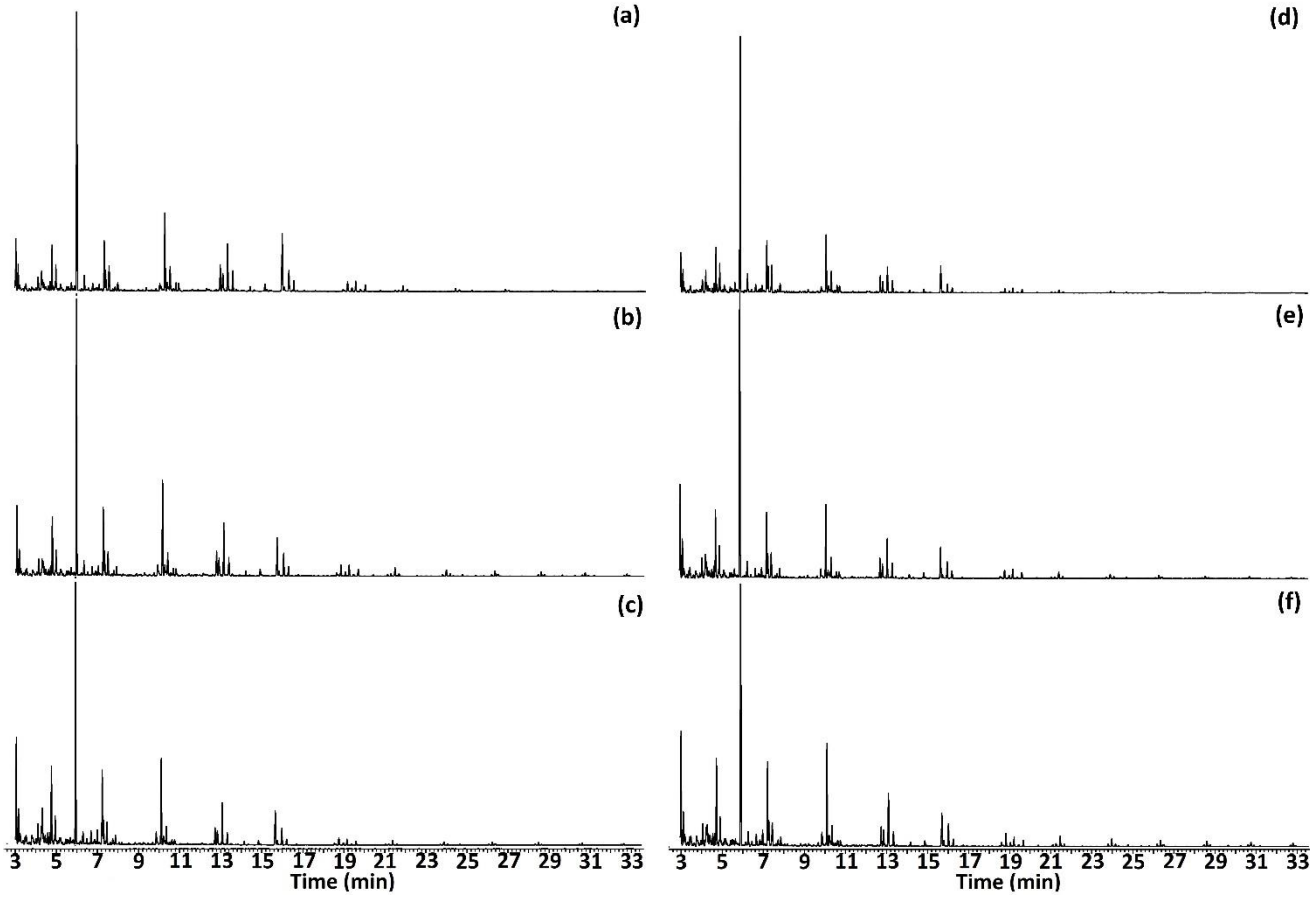

Figure S5. GC-MS chromatograms of impinger trap products of thermal pyrolysis of BMP at (a) 500 °C, (b) 550 °C, (c) 600 °C and CMP at (d) 500 °C, (e) 550 °C, and (f) 600 °C.

Table S3. Identified compounds collected in an impinger of thermal pyrolysis of BMP and CMP at 500, 550, and 600 °C. The units are mg compound / g resultant product.

Compound Name	Formula	M^+ (m/z)	RT	BMP500	BMP550	BMP600	CMP500	CMP550	CMP600
			Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
1-Heptene	C_7H_{14}	98	3.05	53.1	109	194	79.8	168	198
Heptane	C_7H_{16}	100	3.16	27.1	44.5	66.7	49.8	71.7	64.1
3,5-Dimethylcyclopentene	C_7H_{12}	96	3.23	5.66	12.5	20.8	12.7	26.9	27.7
3-Hepten-1-ol	$C_7H_{14}O$	114	3.39	-	4.34	4.57	4.97	7.28	9.17
1-methyl-2-methylene-Cyclopentane,	C_7H_{12}	96	3.48	3.50	8.24	11.6	6.77	12.4	16.5
methyl-Cyclohexane	C_7H_{14}	98	3.53	8.18	13.6	16.4	16.4	23.5	42.2
ethyl-Cyclopentane	C_7H_{14}	98	3.7	-	6.06	8.60	7.95	9.47	26.29
3-methyl-Cyclohexene	C_7H_{12}	96	3.81	-	8.08	17.9	14.9	26.4	39.9
Methylenecyclooctane	C_9H_{16}	112	3.85	-	8.66	14.7	-	-	-
2-methyl-2-Hexen-4-yne	C_7H_{10}	94	3.96	-	-	2.38	-	-	-
5-Methyl-1,5-hexadien-3-ol	$C_7H_{12}O$	112	4	2.27	6.62	8.71	6.08	7.21	9.63
4-methyl-1-Heptene	C_8H_{16}	112	4.11	17.5	36.9	46.4	39.5	49.4	55.2
4-methyl-Heptane	C_8H_{18}	114	4.27	18.2	27.9	36.2	50.5	46.0	35.4
Toluene	C_7H_8	92	4.32	9.36	16.6	57.4	13.8	26.4	38.6
Methylene-Cyclohexane-	C_7H_{12}	96	4.37	7.29	14.1	12.1	15.4	18.2	20.9
(2,2-dimethylpropylidene)-Cyclopropane	C_8H_{14}	110	4.44	-	-	-	13.9	20.5	28.1
(E)-1,4,9-Decatriene	$C_{10}H_{16}$	136	4.61	-	11.4	20.6	12.9	18.5	24.1
2-methyl-1-Heptene	C_8H_{16}	112	4.68	9.02	12.9	18.9	17.5	21.3	22.9
1-Octene	C_8H_{16}	112	4.77	44.6	83.7	133	96.4	130	147
1,2,3-trimethyl-Cyclopentene	C_8H_{14}	110	4.91	3.03	6.76	-	9.74	11.4	5.46
Octane	C_8H_{18}	114	4.95	24.5	35.1	46.4	60.7	57.0	40.4
1,3-Dimethyl-1-cyclohexene	C_8H_{14}	110	4.98	-	-	-	8.03	6.85	4.63
(Z)-3-Octene,	C_8H_{16}	112	5.08	-	-	-	8.31	6.49	4.97
1,4-dimethyl-cis-Cyclohexane	C_8H_{16}	112	5.12	2.84	5.52	4.87	16.1	13.1	8.30
1,1,3,4-tetramethyl-cis-Cyclopentane	C_9H_{18}	126	5.18	6.44	6.29	8.89	9.60	8.48	7.67
3,3,5-trimethyl-1-Hexene	C_9H_{18}	126	5.24	2.97	6.27	10.2	5.15	5.56	3.37
2,3-Dimethyl-cyclohexa-1,3-diene	C_8H_{12}	108	5.31	-	-	2.52	-	-	-
2,4-dimethyl-Heptane	C_9H_{20}	128	5.47	4.85	6.12	8.47	14.1	13.1	8.09
1-Methyl-2-methylenecyclohexane	C_8H_{14}	110	5.55	3.94	7.94	7.86	10.9	12.5	8.60
1,2-dimethyl-4-methylene-Cyclopentene	C_8H_{12}	108	5.62	-	-	5.08	3.87	7.12	5.98
1,3,5-trimethyl-Cyclohexane	C_9H_{18}	126	5.69	7.98	10.3	10.2	20.9	17.8	10.0
2-oxo-3-Cyclopentene-1-acetaldehyde	$C_7H_8O_2$	124	5.84	4.52	3.33	-	-	-	-
2,4-Dimethyl-1-heptene	C_9H_{18}	126	5.96	324	475	589	653	600	554
1,2-Dipropylcyclopropene	C_9H_{16}	124	6.19	-	-	7.51	10.2	8.24	11.8
1,3,5-trimethyl-(1α,3α,5β)-Cyclohexane	C_9H_{18}	126	6.31	16.4	24.3	24.7	45.3	32.2	28.3
Ethylbenzene	C_8H_{10}	106	6.5	3.14	4.95	9.40	8.15	6.51	7.50
5-Ethylcyclopent-1-enecarboxaldehyde	$C_8H_{12}O$	124	6.71	9.82	20.1	27.4	22.3	19.8	24.5
Cyclohexanemethanol	$C_7H_{14}O$	114	6.89	4.67	-	11.2	9.98	9.51	13.2
3,3,5-trimethyl-Cyclohexene	C_9H_{16}	124	6.96	3.62	-	3.75	8.81	5.19	5.81
Bicyclo[6.1.0]nonane	C_9H_{16}	124	7.03	5.85	14.1	24.4	12.5	17.5	24.4
2-ethyl-1,1-dimethyl-Cyclopentane	C_9H_{18}	126	7.08	-	-	-	6.12	4.09	145

Compound Name	Formula	M^+ (m/z)	RT	BMP500	BMP550	BMP600	CMP500	CMP550	CMP600
			Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
1-Nonene	C_9H_{18}	126	7.26	53.3	99.4	137	107	116	45.8
3-Ethyl-4-methylpentan-1-ol	$C_8H_{18}O$	130	7.32	21.9	31.6	51.2	51.3	49.3	53.6
Nonane	C_9H_{20}	128	7.49	28.9	48.1	48.7	64.4	54.9	-
cis-2-Nonene	C_9H_{18}	126	7.67	3.37	5.33	5.69	9.56	7.48	7.72
cyclopropyl-Cyclohexane	C_9H_{16}	124	7.78	4.91	9.52	12.1	7.21	12.4	15.5
6,7-dimethyl Bicyclo[4.2.0.]octane	$C_{10}H_{18}$	138	7.87	-	-	-	19.9	20.2	5.3
2,7-dimethyl-1,7-Octadiene	$C_{10}H_{18}$	138	7.91	8.65	13.9	16.6	3.58	-	-
2-propenyl-Cyclohexane	C_9H_{16}	124	8.09	-	-	4.16	3.74	2.80	18.3
octahydro-(1aα,1bβ,4aα,5aα)-Pentaleno[1,2-b]oxirene,	$C_8H_{12}O$	124	8.22	1.71	-	4.58	4.95	3.44	4.86
trans-1,2-Diethyl cyclopentane	C_9H_{18}	126	8.64	-	1.94	2.40	2.92	2.57	2.98
1-butyl-Cyclopentene	C_9H_{16}	124	8.88	-	4.66	6.53	6.58	5.86	1.72
1-Undecanol	$C_{11}H_{24}O$	172	8.99	-	-	-	5.81	2.94	6.20
2,3-dimethyl-Octane	$C_{10}H_{22}$	142	9.27	2.74	3.90	3.04	7.62	4.05	2.56
1-methyl-4-(1-methylethenyl)-trans-Cyclohexane	$C_{10}H_{18}$	138	9.74	1.99	3.78	7.30	4.00	4.38	5.57
(Z)-Cyclodecene	$C_{10}H_{18}$	138	9.91	8.16	15.6	20.9	15.6	17.3	25.9
Phenol	C_6H_6O	94	9.96	6.54	9.04	-	6.15	-	-
1-Decene	$C_{10}H_{20}$	140	10.2	86.8	156	173	135	146	192
6-methyl-2-Hepten-4-one	$C_8H_{14}O$	126	10.3	9.21	14.5	19.1	14.2	16.4	19.7
Decane	$C_{10}H_{22}$	142	10.4	27.5	38.1	31.0	49.8	42.2	37.9
4-methyl-1-Decene	$C_{11}H_{22}$	154	10.5	-	-	2.67	2.79	3.87	6.55
trans-Hexahydrophthalide	$C_8H_{12}O_2$	140	10.6	3.46	5.43	4.60	6.03	6.91	11.4
2,6-dimethyl-Nonane	C11H24	156	10.7	10.1	13.6	11.2	17.9	15.8	16.4
4-methyl-Decane	$C_{11}H_{24}$	156	10.8	9.54	16.3	12.7	19.9	16.3	17.6
2-ethyl-1-Hexanol	$C_8H_{18}O$	130	11.5	2.41	3.08	2.43	4.55	3.99	3.74
1-Methylpentyl cyclopropane	C_9H_{18}	126	11.7	1.63	3.86	2.52	2.72	-	-
3-pentyl-(2Z)-2,4-Pentadien-1-ol	$C_{10}H_{18}O$	154	12.15	3.44	6.69	5.67	4.29	-	-
2,4-dimethyl-2-Decene	$C_{12}H_{24}$	168	12.2	-	-	-	6.15	-	-
Tetrahydrogeranyl formate	$C_{11}H_{22}O_2$	186	12.8	30.9	41.3	34.3	39.8	40.8	34.5
1,11-Dodecadiene	$C_{12}H_{22}$	166	12.9	26.5	34.8	31.5	32.7	35.4	34.6
1-Dodecene	$C_{12}H_{24}$	168	13.2	56.7	90.9	86.4	62.6	82.2	103
Dodecane	$C_{12}H_{26}$	170	13.4	23.4	30.9	23.8	29.2	31.5	26.5
(E)-Tetradec-2-enal	$C_{14}H_{26}O$	210	13.6	-	-	4.73	2.90	4.89	4.27
3,7,11-trimethyl-1-Dodecanol	$C_{15}H_{32}O$	228	14.2	5.71	8.31	7.04	-	9.32	9.55
2,6,6-trimethyl-Bicyclo[3.1.1]heptane	$C_{10}H_{18}$	138	14.9	8.51	11.4	8.83	9.58	12.3	10.9
2-Isopropenyl-5-methylhex-4-enal	$C_{10}H_{16}O$	152	14.9	-	-	-	-	4.62	3.07
(E)-3-Tetradecene	$C_{14}H_{28}$	196	15.9	3.63	7.43	7.15	7.17	7.30	11.8
1-Tetradecene	$C_{14}H_{28}$	196	16.1	25.6	40.7	33.6	23.9	36.5	47.9
Tetradecane	$C_{14}H_{30}$	198	16.3	13.2	16.5	11.8	12.8	17.1	14.8
(1,2-dimethylpropyl)-Cyclohexane	$C_{11}H_{22}$	154	16.8	1.83	2.40	1.87	2.15	-	-
2,3-dihydro-Benzofuran	C_8H_8O	120	16.9	0.75	1.36	0.88	-	-	-
1-Ethyl-2,2,6-trimethylcyclohexane	$C_{11}H_{22}$	154	18.2	0.79	1.06	-	-	-	-
8-Dodecenol	$C_{12}H_{24}O$	152	18.7	2.46	4.68	4.71	1.59	4.83	7.27
Hydroquinone	$C_6H_6O_2$	110	18.7	1.09	1.89	1.58	10.5	18.7	26.2
1-Tridecene	$C_{13}H_{26}$	182	18.9	11.5	19.9	14.73	-	-	-
Tridecane	$C_{13}H_{28}$	184	19.1	5.23	7.07	4.60	5.40	7.62	7.37

Compound Name	Formula	M^+ (m/z)	RT	BMP500	BMP550	BMP600	CMP500	CMP550	CMP600
			Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
2-butyl-1-Octanol	$C_{12}H_{26}O$	186	19.3	13.8	20.1	13.4	12.9	20.2	19.4
1-Dodecanol	$C_{12}H_{26}O$	186	19.5	3.07	4.18	2.58	3.48	4.20	4.08
5-methyl-2-(1-methylethyl)-1-Hexanolacetate	$C_{12}H_{24}O_2$	200	19.7	8.48	12.6	8.12	8.48	13.2	12.2
2-Methyl-1-undecanol	$C_{12}H_{26}O$	186	20.5	1.64	2.06	-	-	-	-
1,14-Tetradecanediol	$C_{14}H_{30}O_2$	230	21.2	1.91	3.28	1.44	2.74	3.32	3.89
1,13-Tetradecadiene	$C_{14}H_{26}$	194	21.3	1.87	4.48	3.04	2.42	4.07	6.73
1-Pentadecyne	$C_{15}H_{28}$	208	21.5	7.18	15.7	9.78	6.94	14.2	21.3
E-10-Pentadecenol	$C_{15}H_{30}O$	226	21.7	2.71	4.17	2.21	3.12	4.98	5.34
(Z)-11-Hexadecen-1-ol	$C_{16}H_{32}O$	240	23.9	1.25	3.77	1.97	1.34	2.77	5.08
1-Hexadecanol	$C_{16}H_{34}O$	242	24.1	4.20	11.9	7.02	4.63	9.67	17.3
1-Pentadecene	$C_{15}H_{30}$	210	24.2	1.99	3.80	2.11	2.65	3.77	5.38
2-Hexyl-1-decanol	$C_{16}H_{34}O$	242	24.4	1.26	0.73	-	-	-	-
2-Hexyl-1-octanol	$C_{14}H_{30}O$	214	24.8	0.61	3.18	-	-	-	-
Hexadecadiene	$C_{16}H_{30}$	222	26.2	0.77	2.99	2.28	-	-	-
1-Hexadecene	$C_{16}H_{32}$	224	26.4	2.72	9.26	5.86	-	6.87	12.68
hexadecyl-Oxirane	$C_{18}H_{36}O$	268	26.5	1.00	2.15	1.32	-	-	-
Hexadecane	$C_{16}H_{34}$	226	26.6	1.27	3.46	1.71	-	-	-
n-Heptadecadiene	$C_{17}H_{32}$	236	28.5	0.68	2.74	2.29	-	-	-
1-Heptadecene	$C_{17}H_{34}$	238	28.7	2.04	7.70	5.76	-	5.74	11.3
Heptadecane	$C_{17}H_{36}$	240	28.8	0.85	2.95	1.67	-	-	-
2-methyl-1-Hexadecanol	$C_{17}H_{36}O$	256	29.7	0.72	2.42	-	-	-	-
4-Hexyldecan-1-ol	$C_{16}H_{34}O$	242	30.7	0.51	2.09	1.78	-	-	-
1-Octadecene	$C_{18}H_{36}$	252	30.8	1.63	5.97	4.74	-	4.47	9.45
Octadecane	$C_{18}H_{38}$	254	30.9	0.85	2.26	1.45	-	-	-
Cyclododecanemethanol	$C_{13}H_{26}O$	198	31.2	0.46	1.88	-	-	-	-
8,11-Nonadecadiene	$C_{19}H_{36}$	264	32.7	0.32	1.59	1.69	-	-	-
1-Nonadecene	$C_{19}H_{38}$	266	32.9	1.13	4.26	3.70	-	-	7.21
Nonadecane	$C_{19}H_{40}$	268	32.9	0.71	1.69	1.44	-	-	-

Table S4. Identified compounds in gasoline used as a standard. The units are mg compound per g resultant liquid product.

Compound Name	M+	Formula	RT min	Gasoline mg/g
2,2-Dimethylbutane	86	C_6H_{14}	1.99	19.7
3-methylene-Pentane	84	C_6H_{12}	2.10	29.6
methyl-Cyclopentane	84	C_6H_{12}	2.35	32.4
2,4-dimethyl-Pentane	100	C_7H_{16}	2.71	73.9
3-ethyl-Pentane	100	C_7H_{16}	2.81	32.3
2,2,3,3-Tetramethylbutane	114	C_8H_{18}	2.97	65.8
3-methyl-Hexane	100	C_7H_{16}	3.13	25.2
3,3-dimethyl-1,4-Pentadiene	96	C_7H_{12}	3.20	6.79
methyl-Cyclohexane	95	C_7H_{14}	3.50	23.1
2,5-dimethyl-Hexane	114	C_8H_{18}	3.59	6.46
2,4-dimethyl-Hexane	114	C_8H_{18}	3.63	11.6
1,2,4-trimethyl-Cyclopentane	112	C_8H_{18}	3.77	4.72
3-Ethylpentane	100	C_7H_{16}	3.92	19.7
2,3,3-Trimethylpentane	114	C_8H_{18}	4.02	14.2
2,3-Dimethylhexane	114	C_8H_{18}	4.11	9.73
2-Methylheptane	114	C_8H_{18}	4.22	21.5
Toluene	92	C_7H_8	4.31	104
3-Methylheptane	114	C_8H_{18}	4.37	21.9
1,3-dimethyl-trans-Cyclohexane	112	C_8H_{16}	4.49	6.27
2,2,4-Trimethylhexane	128	C_9H_{20}	4.55	7.25
Ethylcyclohexane	112	C_8H_{16}	4.69	3.27
3-Ethylhexane	114	C_8H_{18}	4.93	17.6
1,4-Dimethylcyclohexane	112	C_8H_{16}	5.07	4.13
1,4-dimethyl-cis-Cyclohexane	112	C_8H_{16}	5.18	3.21
2,3-Dimethylheptane	128	C_9H_{20}	5.28	1.85
2,4-dimethyl-Heptane	128	C_9H_{20}	5.45	3.39
2-Methyloctane	128	C_9H_{20}	5.60	4.00
3,5-Dimethylheptane	128	C_9H_{20}	5.76	9.34
1,2,4-Trimethylcyclohexane	126	C_9H_{18}	6.18	1.68
3-Ethyl-2,4-dimethylpentane	128	C_9H_{20}	6.30	2.66
Ethylbenzene	106	C_8H_{10}	6.49	48.5
p-Xylene	106	C_8H_{10}	6.71	129
2,2,3-Trimethyldecane	184	$C_{13}H_{28}$	6.86	3.11
2,2-Dimethyloctane	142	$C_{10}H_{22}$	7.05	4.00
1-ethyl-2-methyl-cis-Cyclohexane	126	C_9H_{18}	7.14	2.54
o-Xylene	106	C_8H_{10}	7.34	49.4
1-Nonene	126	C_9H_{18}	7.47	9.35
1-ethyl-2-methyl-Cyclohexane	128	C_9H_{20}	7.67	2.19
2,3-Dimethyloctane	142	$C_{10}H_{22}$	7.91	1.70
2,4,6-Trimethylheptane	142	$C_{10}H_{22}$	7.96	1.33
4-Methylnonane	142	$C_{10}H_{22}$	8.18	2.14
Cumene	120	C_9H_{12}	8.22	3.41
2,6-Dimethyloctane	142	$C_{10}H_{22}$	8.43	3.73
3,4,5-trimethyl-Heptane	142	$C_{10}H_{22}$	8.6	1.63
3-Ethyl-2-methylheptane	142	$C_{10}H_{22}$	8.65	0.91
Propylbenzene	120	C_9H_{12}	9.07	15.0
2,2,6-Trimethyloctane	156	$C_{11}H_{24}$	9.21	9.50
1-ethyl-3-methyl-Benzene	120	C_9H_{12}	9.30	64.5
1-ethyl-4-methyl-Benzene	120	C_9H_{12}	9.50	26.6
1-ethyl-2-methyl-Benzene	120	C_9H_{12}	9.84	16.3
Mesitylene	120	C_9H_{12}	10.25	64.0
Decane	142	$C_{10}H_{22}$	10.39	6.14
Isobutylbenzene	134	$C_{10}H_{14}$	10.65	1.25
Sec-butylbenzene	134	$C_{10}H_{14}$	10.75	1.84
1,2,4-Trimethylbenzene	120	C_9H_{12}	11.11	17.9
Allylbenzene	118	C_9H_{10}	11.42	2.02
Indane	118	C_9H_{10}	11.52	7.15
1,3-Diethylbenzene	134	$C_{10}H_{14}$	11.92	3.75
1-Methyl-3-propylbenzene	134	$C_{10}H_{14}$	11.97	12.4

Compound Name	M+	Formula	RT min	Gasoline mg/g
4-methylene-1-(1-methylethyl)-Bicyclo[3.1.0]hex-2-ene	134	$C_{10}H_{14}$	12.11	9.98
2-Ethyl-p-xylene	134	$C_{10}H_{14}$	12.19	12.2
2-Methyldecane	156	$C_{11}H_{24}$	12.30	4.04
1-Methyl-2-propylbenzene	134	$C_{10}H_{14}$	12.44	3.05
3-Methyldecane	156	$C_{11}H_{24}$	12.50	1.90
1-Ethyl-2,4-dimethylbenzene	134	$C_{10}H_{14}$	12.75	6.58
4-ethyl-1,2-dimethyl-Benzene	134	$C_{10}H_{14}$	12.80	5.60
4-Allyltoluene	132	$C_{10}H_{12}$	12.87	0.99
p-Cymene	134	$C_{10}H_{14}$	12.99	13.8
O-Cymene	134	$C_{10}H_{14}$	13.20	0.70
Undecane	156	$C_{11}H_{24}$	13.38	3.15
1-methyl-4-(2-methylpropyl)-Benzene	148	$C_{11}H_{16}$	13.46	0.86
(1,1-dimethylpropyl)-Benzene	148	$C_{11}H_{16}$	13.55	0.91
1-Ethyl-3,5-dimethylbenzene	134	$C_{10}H_{14}$	13.63	2.30
trans-4a-Methyl-decahydronaphthalene	152	$C_{11}H_{20}$	13.72	0.52
1,2,4,5-Tetramethylbenzene	134	$C_{10}H_{14}$	14.04	9.34
3,7-Dimethyldecane	170	$C_{12}H_{26}$	14.18	0.69
1-Methyl-4-(1-methylpropyl)-benzene	148	$C_{11}H_{16}$	14.52	1.71
5-Methylindan	132	$C_{10}H_{12}$	14.60	4.01
1,3-Diethyl-4-methylbenzene	148	$C_{11}H_{16}$	14.71	1.52
3,5-Diethyltoluene	148	$C_{11}H_{16}$	14.75	2.18
1-Methylindan	132	$C_{10}H_{12}$	14.93	5.06
1,4-Diethylbenzene	132	$C_{10}H_{12}$	14.98	4.55
Isopentylbenzene	148	$C_{11}H_{16}$	15.12	2.20
2,4-dimethyl-1-(1-methylethyl)-Benzene	148	$C_{11}H_{16}$	15.28	3.08
1,4-Diethyl-2-methylbenzene	148	$C_{11}H_{16}$	15.36	0.76
3-Methylundecane	170	$C_{12}H_{26}$	15.45	0.98
1-methyl-4-(1-methyl-2-propenyl)-Benzene	146	$C_{11}H_{14}$	15.87	0.59
Naphthalene	128	$C_{10}H_{8}$	15.99	6.45
1,1-Dimethylindan	146	$C_{11}H_{14}$	16.00	1.79
2,3-dihydro-2,2-Dimethylindene	146	$C_{11}H_{14}$	16.07	0.95
pentamethyl-Benzene	148	$C_{11}H_{16}$	16.30	3.68
4,7-Dimethylindan	146	$C_{11}H_{14}$	17.78	2.42
1,6-Dimethylindan	146	$C_{11}H_{14}$	18.17	1.04
2-methyl-Naphthalene	142	$C_{11}H_{10}$	19.05	6.92
1-methyl-Naphthalene	142	$C_{11}H_{10}$	19.51	2.94
2-ethyl-Naphthalene	156	$C_{12}H_{12}$	21.71	0.68
2,6-dimethyl-Naphthalene	156	$C_{12}H_{12}$	21.97	0.84
1,7-dimethyl-Naphthalene	156	$C_{12}H_{12}$	22.35	0.91
1,5-dimethyl-Naphthalene	156	$C_{12}H_{12}$	22.44	0.45

Table S5. Identified compounds in products of catalytic pyrolysis of BMP and CMP at 500,550, and 600 °C collected from the impinger. The units are mg compound per g resultant product.

Compound Name	Formula	M^+	RT	BMP 500	BMP 550	BMP600	CMP 500	CMP 550	CMP600
		(m/z)	Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
2-methyl-Pentane	C_6H_{14}	86	1.93	15.2	147	143	342	299	254
3-methyl-Pentane	C_6H_{14}	86	2.00	7.43	144	142	450	140	145
n-Hexane	C_6H_{14}	86	2.11	6.20	92.1	92.0	240	48.7	27.1
3-methyl-(Z)-2-Pentene,	C_6H_{12}	84	2.18	0.32	5.65	2.00	104	54.3	38.1
4-methyl-(Z)-2-Pentene	C_6H_{12}	84	2.28	1.18	11.5	6.11	59.9	52.5	29.1
(Z)-3-Hexene	C_6H_{12}	84	2.22	-	-	-	-	21.15	-
methyl-Cyclopentane	C_6H_{12}	84	2.35	1.53	24.3	20.3	90.9	32.1	37.8
4-Methyl-1,3-pentadiene	C_6H_{10}	82	2.42	-	-	-	-	-	8.02
1,3,5-Hexatriene	C_6H_8	80	2.46	-	-	-	-	-	14.3
(Z)-1,4-Hexadiene	C_6H_{10}	82	2.59	-	-	-	33.7	19.9	33.4
Benzene	C_6H_6	78	2.7	81.5	393	395	1162	497	817
3-methyl-Hexane	C_7H_{16}	100	2.81	5.10	16.3	21.6	120	30.7	48.1
1,3-dimethyl-Cyclopentane	C_7H_{14}	98	2.99	-	-	-	-	-	50.35
Heptane	C_7H_{16}	100	3.11	4.26	13.2	17.9	79.1	24.9	55.4
2-methyl-(Z)-3-Hexene	C_7H_{14}	98	3.19	-	-	-	37.1	16.6	73.2
2-Heptene	C_7H_{14}	98	3.23	-	-	-	10.2	3.08	-
4-methyl-(E)-2-Hexene	C_7H_{14}	98	3.29	-	-	-	10.3	4.47	7.48
2,4-dimethyl-2-Pentene	C_7H_{14}	98	3.36	-	-	-	14.4	3.53	19.8
methyl-Cyclohexane	C_7H_{14}	98	3.49	-	-	-	212	363	31.1
Toluene	C_7H_8	92	4.28	123	291	301	1106	824	604
3-methyl-Heptane	C_8H_{18}	114	4.36	-	-	-	31.6	28.2	26.6
2,4-dimethyl-Hexane	C_8H_{18}	114	4.91	-	-	-	30.5	7.60	16.8
2-Methyl-2-heptene	C_8H_{16}	112	4.98	-	-	-	7.43	5.42	4.43
1,2-dimethyl-Cyclohexene	C_8H_{14}	110	5.15	-	-	-	10.4	6.23	4.69
Ethylbenzene	C_8H_{10}	106	4.91	7.49	5.04	3.70	51.5	10.7	30.3
p-Xylene	C_8H_{10}	106	6.45	46.9	47.9	6.16	327	94.6	204
o-Xylene	C_8H_{10}	106	6.65	17.5	13.7	50.3	83.5	34.7	61.4
1-ethyl-2-methyl-benzene	C_9H_{12}	120	7.3	3.37	-	15.2	28.1	14.4	21.9
1,2,4-trimethyl-Benzene	C_9H_{12}	120	9.46	3.50	2.55	1.65	15.8	17.6	17.7

Table S6. Identified compounds in liquid products of catalytic pyrolysis of BMP and CMP at 500, 550, and 600 °C, collected from the condenser. The units are mg compound / g liquid product.

Compound Name	Formula	M^+ (m/z)	RT	BMP 500	BMP 550	BMP600	CMP 500	CMP 550	CMP600
			Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
3-methyl-pentane	C_6H_{14}	86	2.24	4.76	121	247	53.5	142	286
Hexane	C_6H_{14}	86	2.33	5.79	50.6	987	39.9	152	276
3-methyl-(Z)-2-Pentene	C_6H_{12}	84	2.37	15.6	36.9	246	3.25	8.96	295
3-methyl-Cyclopentene	C_6H_{12}	84	2.59	23.7	24.9	4.19	43.9	2.30	5.88
1,3-Hexadiene-5-yne	C_6H_6	78	2.63	34.2	55.8	26.5	44.4	121	28.5
Benzene	C_6H_6	78	2.71	44.8	122	198	94.4	121	156
3-methyl-Hexane	C_7H_{16}	100	2.81	13.8	424	59.9	28.6	40.4	18.4
Heptane	C_7H_{16}	100	3.11	16.5	89.5	31.2	21.3	21.5	33.5
3-methyl-(Z)-3-Hexene	C_7H_{14}	98	3.18	-	-	11.0	21.3	11.2	24.1
4-methyl-(E)-2-Hexene	C_7H_{14}	98	3.29	-	-	4.98	4.11	3.15	7.00
3,4-dimethyl-(E)-2-Pentene	C_7H_{14}	98	3.34	-	-	9.72	36.2	3.69	13.7
methyl-Cyclohexane	C_7H_{14}	98	3.48	-	-	4.59	46.58	5.46	11.0
2,5-dimethyl-Hexane	C_8H_{18}	114	3.58	-	-	2.51	3.53	2.16	3.33
2,4-dimethyl-Hexane	C_8H_{18}	114	3.61	-	-	3.71	6.63	5.29	8.75
Toluene	C_7H_8	92	4.28	370	707	3.97	13.8	217	805
3-methyl-Heptane	C_8H1_8	114	4.36	-	-	11.1	8.28	313	13.6
2-methyl-1-Heptene	C_8H_{16}	112	4.65	-	-	9.80	64.6	57.7	13.8
1-ethyl-3-methyl-Cyclopentan	C_8H_{16}	112	4.75	-	-	3.04	43.9	39.2	4.27
2,3-dimethyl-2-Hexene	C_8H_{16}	112	4.86	14.1	11.1	13.8	41.5	37.1	49.1
2,5-dimethyl-2-Hexene	C_8H_{16}	112	4.96	-	-	1.01	11.4	57.8	10.5
2-Octene	C_8H_{16}	112	5.05	-	-	8.83	46.4	41.5	12.4
4-Methyl-1,4-heptadiene	C_8H_{14}	110	5.13	-	-	2.14	8.08	98.1	14.9
(Z)-3-Octene	C_8H_{16}	112	5.24	-	-	0.99	40.2	1.32	9.00
Octane	C_8H_{18}	114	5.4	15.1	18.8	2.68	4.17	3.11	10.3
2,6-dimethyl-Heptane	C_9H_{20}	128	5.56	-	-	1.89	3.49	2.26	8.84
2,5-dimethyl-Heptane	C_9H_{20}	128	5.72	16.4	108	3.70	43.8	328	20.9
cis-2-Nonene	C_9H_{18}	126	5.89	-	-	9.61	-	-	13.5
2,6-dimethyl-3-Heptene	C_9H_{18}	126	5.98	-	-	4.84	-	-	6.81
2,2,3-trimethyl-Bicyclo[2.2.1]heptane	$C_{10}H_{18}$	138	6.13	-	-	5.55	-	-	7.80
1,1,2-trimethyl-Cyclohexane	C_9H_{18}	126	6.25	-	-	1.19	1.97	2.14	9.10
Ethylbenzene	C_8H_{10}	106	6.44	53.6	636	133	37.5	31.9	137
p-Xylene	C_8H_{10}	106	6.66	519	219	229	232	328	778
1-Nonene	C_9H_{18}	126	7.2	-	-	23.5	-	-	32.9
o-Xylene	C_8H_{10}	106	7.29	176	47.5	76.7	39.5	77.9	277
Nonane	C_9H_{20}	128	7.42	12.8	16.7	8.16	7.50	11.2	47.8
2-Nonene, (E)-	C_9H_{18}	126	7.6	-	-	15.5	-	5.64	21.8
cis-4-Nonene	C_9H_{18}	126	7.95	-	-	3.75	1.04	36.7	5.27
propyl-Benzene	C_9H_{12}	120	9.01	7.57	118	4.90	4.46	12.7	27.4
1-ethyl-2-methyl-Benzene	C_9H_{12}	120	9.3	64.5	764	32.9	38.4	44.2	94.7
1-ethyl-4-methyl-Benzene	C_9H_{12}	120	9.33	30.7	100	11.8	13.1	10.2	42.9
1,2,4-trimethyl-Benzene	C_9H_{12}	120	9.5	92.7	22.9	38.2	56.04	105	102

Compound Name	Formula	M^+ (m/z)	RT	BMP 500	BMP 550	BMP600	CMP 500	CMP 550	CMP600
			Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
1,2,3-trimethyl-Benzene	C_9H_{12}	120	9.82	19.9	268	9.02	9.89	10.4	38.2
Mesitylene	C_9H_{12}	120	10.3	222	32.	94.9	131	181	169
Decane	$C_{10}H_{22}$	142	10.4	5.92	49.8	8.09	5.21	18.2	26.1
cis-4-Decene	$C_{10}H_{20}$	140	10.6	-	-	5.73	86.5	77.3	81.1
1-ethyl-3-methyl-Benzene	C_9H_{12}	120	11.1	37.2	3.49	18.5	23.6	19.7	48.6
Indane	C_9H_{10}	118	11.5	1.61	80.1	-	-	-	-
1,3-diethyl-Benzene	$C_{10}H_{14}$	134	11.9	2.44	22.9	2.12	1.96	2.40	14.5
(1-methylpropyl)-Benzene	$C_{10}H_{14}$	134	12.1	8.29	18.6	4.74	4.82	4.86	11.2
1-methyl-4-propyl-Benzene	$C_{10}H_{14}$	134	12.1	29.4	283	10.9	2.26	4.41	20.85
4-ethyl-1,2-dimethyl-Benzene	$C_{10}H_{14}$	134	12.4	22.2	6.67	2.57	12.3	15.7	3.61
1-methyl-3-propyl-Benzene	$C_{10}H_{14}$	134	12.7	9.26	19.8	5.69	2.10	1.45	15.2
2-ethyl-1,4-dimethyl-Benzene	$C_{10}H_{14}$	134	12.7	8.32	12. 5	5.41	7.61	1.19	13.1
1-methyl-3-(1-methylethyl)-Benzene	$C_{10}H_{14}$	134	12.8	10.7	-	3.61	6.44	5.91	5.07
1,3,8-p-Menthatriene	$C_{10}H_{14}$	134	12.9	19.1	24.1	10.4	12.1	10.8	24.5
(E)-5-Undecene	$C_{11}H_{22}$	154	13.1	-	-	17.2	1.29	33.2	24.2
(Z)-4-Undecene	$C_{11}H_{22}$	154	13.1	-	-	4.97	1.12	48.8	6.98
Undecane	$C_{11}H_{24}$	156	13.3	1.52	39.9	7.83	5.93	9.53	26.3
1-ethyl-2,3-dimethyl- Benzene	$C_{10}H_{14}$	134	13.6	3.54	5.63	1.78	2.12	1.99	6.07
1,2,4,5-tetramethyl-benzene	$C_{10}H_{14}$	134	13.9	17.1	27.8	10.7	11.2	12.7	5.67
1,2,3,5-tetramethyl-Benzene	$C_{10}H_{14}$	134	14.1	20.6	35.5	13.7	14.23	16.8	19.8
2,3-dihydro-5-methyl-1H-Indene	$C_{10}H_{12}$	132	14.6	-	-	0.79	1.15	36.6	25.1
1,4-diethyl-2-methyl-Benzene	$C_{11}H_{16}$	148	14.7	-	-	1.60	2.04	2.06	10.71
1-methyl-4-(1-methylpropyl)-Benzene	$C_{11}H_{16}$	148	14.7	-	-	1.50	1.68	2.47	9.44
4-Methylindan	$C_{10}H_{12}$	132	14.9	3.58	7.72	1.23	0.94	1.66	9.28
1-ethyl-3,5-dimethyl-Benzene	$C_{10}H_{14}$	134	14.9	1.79	18.4	5.68	6.36	5.80	14.8
4,4-Dimethyl-1,1a,3a,4,5,6-hexahydrocyclopropa[c]pentalene	$C_{11}H_{16}$	148	15.7	-	-	16.6	1.62	1.48	23.4
Naphthalene	$C_{10}H_8$	128	16.2	14.8	53.6	8.07	12.7	11.5	22.9
(Z)-3-Dodecene	$C_{12}H_{24}$	168	17.3	-	-	1.79	26.5	23.7	2.52
1-ethyl-2,4,5-trimethyl-Benzene	$C_{11}H_{16}$	148	17.7	4.67	32.4	4.77	7.66	10.4	6.71
2,3-dihydro-2,2-Dimethylindene	$C_{11}H_{14}$	146	17.8	0.87	7.69	-	-	-	-
Dodecane	$C_{12}H_{26}$	170	18.7	1.73	7.69	2.63	2.61	49.8	5.22
pentamethyl-Benzene	$C_{11}H_{16}$	148	18.8	18.9	5.18	10.4	2.88	53.9	14.7
1-methyl-Naphthalene	$C_{11}H_{10}$	142	18.9	30.4	90.3	30.8	26.4	26.2	128
2-methyl-Naphthalene	$C_{11}H_{10}$	142	19.5	13.7	36.4	12.8	8.31	9.98	61.7
1,2-dimethyl-Naphthalene	$C_{12}H_{12}$	156	21.6	2.83	24.8	5.31	4.02	6.18	21.1
1,7-dimethyl-Naphthalene	$C_{12}H_{12}$	156	21.9	16.9	27.6	12.3	10.9	10.6	34.4
1,5-dimethyl-Naphthalene	$C_{12}H_{12}$	156	22.3	14.5	29. 1	13.1	9.76	9.52	35.4
2,6-dimethyl-Naphthalene	$C_{12}H_{12}$	156	22.4	7.57	14.1	5.95	5.14	4.77	16.9
2,3-dimethyl-Naphthalene	$C_{12}H_{12}$	156	22.8	4.91	10.6	3.91	2.69	3.03	12.2
1,8-dimethyl-Naphthalene	$C_{12}H_{12}$	156	23.2	1.41	3.76	2.42	1.30	1.70	7.43
1,4-dimethyl-Naphthalene	$C_{12}H_{12}$	156	23.9	2.08	6.63	9.86	1.85	2.42	13.9
Tetradecane	$C_{14}H_{30}$	198	24.2	31.7	10.6	3.11	2.29	4.49	14.9
1,4,5-trimethyl-Naphthalene	$C_{13}H_{14}$	170	24.9	2.09	18.2	3.35	1.86	1.77	5.37

Compound Name	Formula	M^+ (m/z)	RT	BMP 500	BMP 550	BMP600	CMP 500	CMP 550	CMP600
			Min	mg/g	mg/g	mg/g	mg/g	mg/g	mg/g
1,6,7-trimethyl-Naphthalene	$C_{13}H_{14}$	170	25.1	4.22	4.01	3.97	3.07	3.37	7.03
2,3,6-trimethyl-Naphthalene	$C_{13}H_{14}$	170	25.4	4.09	7.23	2.90	3.54	3.32	6.28
1,4,6-trimethyl-Naphthalene	$C_{13}H_{14}$	170	25.5	2.62	6.64	2.83	2.36	3.01	5.18
2-(1-methylethyl)-Naphthalene	$C_{13}H_{14}$	170	26.3	3.73	6.07	0.68	3.09	2.88	12.5
1-(1-methylethyl)-Naphthalene	$C_{13}H_{14}$	170	26.5	4.35	5.87	0.54	4.28	4.44	13.7
Hexadecane	$C_{16}H_{34}$	226	28.8	-	-	2.30	1.37	3.58	13.1
Octadecane	$C_{18}H_{38}$	254	30.9	-	-	1.53	1.79	2.31	25.5
Nonadecane	$C_{19}H_{40}$	268	32.9	-	-	1.36	1.46	2.27	12.9
Eicosane	$C_{20}H_{42}$	282	34.9	-	-	1.48	1.83	55.8	11.5
10-Heneicosene (c,t)	$C_{21}H_{42}$	294	36.7	-	-	0.53	47.9	42.8	11.1
Docosane	$C_{22}H_{46}$	310	38.5	-	-	10.5	35.9	32.1	14.7
Tricosane	$C_{23}H_{48}$	324	40.2	-	-	5.88	39.1	34.8	8.25

Table S7. Carbon number partitioning of alkanes, olefins, aromatics, and oxygenated compounds in the thermal and catalytic pyrolysis products of BMP and CMP. Units are the number of carbons.

Pyrolysis	Sample Name	Alkanes			Olefins			Aromatics			Oxygenated		
		Number of carbons											
		Max	Min	Range	Max	Min	Range	Max	Min	Range	Max	Min	Range
Thermal	BMP500	44	7	38	42	7	36	10	10	1	30	6	25
	BMP 550	44	7	38	42	7	36	10	10	1	30	6	25
	BMP 600	44	8	37	44	7	38	10	10	1	30	3	28
Catalytic	BMP 500	14	6	9	10	6	5	13	6	8			
	BMP 550	14	6	9	10	6	5	13	6	8			
	BMP 600	12	6	7	10	6	5	14	6	9			
Thermal	CMP500	44	8	37	42	7	36	10	10	1	30	6	25
	CMP 550	44	8	37	42	7	36	10	10	1	30	6	25
	CMP 600	44	7	38	42	7	36	10	10	1	28	6	23
Catalytic	CMP 500	23	6	18	21	6	16	13	6	8			
	CMP 550	23	6	18	21	6	16	13	6	8			
	CMP 600	23	6	18	21	6	16	13	6	8			

Table S8. Identified gas products of thermal pyrolysis of BMP and CMP at 500, 550, and 600 °C. The units are percent compound of total collected gas.

Compound Name	Formula	M+	RT	BMP500	BMP550	BMP600	CMP500	CMP550	CMP600
			Min	%	%	%	%	%	%
Carbon monoxide	CO	28	1.09	84.9	69.8	21.0	52.3	9.86	12.3
Methane	CH_4	16	1.18	-	10.91	-	8.19	1.78	-
Carbon dioxide	CO_2	44	1.45	0.33	0.33	7.64	5.16	0.82	0.51
Ethylene	C_2H_4	28	2.03	2.82	3.96	6.18	-	1.84	0.99
Ethane	C_2H_6	30	2.59	1.28	2.19	2.89	1.75	0.88	0.40
Propene	C_3H_6	42	9.32	3.70	4.68	21.70	4.79	10.36	7.40
Propane	C_3H_8	44	10.07	0.77	0.49	2.64	0.27	1.10	0.76
Acetaldehyde	C_2H_4O	44	14.04	-	-	-	-	-	0.51
1,3-Butadiene	C_4H_6	54	17.35	-	-	4.92	1.55	5.55	5.74
Methylenecyclopropane	C_4H_6	54	17.42	0.66	0.61	7.41	0.98	-	-
2-methyl-1-Propene	C_4H_8	56	17.57	0.69	0.92	4.76	1.16	4.81	4.93
2-Butene	C_4H_8	56	17.82	0.46	0.71	-	-	7.59	7.96
Butane	C_4H_{10}	58	18.31	-	-	0.73	-	1.04	0.82
1-Butene	C_4H_8	56	18.46	-	-	1.29	0.31	1.01	1.04
(Z)-2-Butene	C_4H_8	56	18.7	-	-	0.79	-	0.55	0.75
2-Propenal	C_3H_4O	56	21.03	-	-	-	-	-	0.32
Propanal	C_3H_6O	58	21.67	-	-	-	7.64	0.18	0.24
1,1-dimethyl-Cyclopropane	C_5H_{10}	70	21.96	-	-	-	-	3.26	0.51
1,3-Pentadiene	C_5H_8	68	23.5	-	-	0.61	0.13	1.27	1.23
ethyl-Cyclopropane	C_5H_{10}	70	24.28	1.00	1.22	5.84	1.52	12.3	14.2
Isoprene	C_5H_8	68	24.67	-	-	0.84	0.31	2.10	2.10
1-Pentene	C_5H_{10}	70	24.83	-	-	-	0.40	11.2	10.0
3-methyl-1-Butene	C_5H_{10}	70	24.96	1.31	1.05	5.29	-	-	-
1,4-Pentadiene	C_5H_8	68	25.79	-	-	0.87	0.63	2.86	3.01
Cyclopentene	C_5H_8	68	25.81	-	0.35	0.46	-	-	-
Pentane	C_5H_{12}	72	27.97	-	-	-	10.9	1.46	1.55
3-methyl-(Z)-2-Pentene	C_6H_{12}	84	28.96	-	-	-	-	0.88	1.29
Bicyclo[3.1.0]hexane	C_6H_{10}	82	29.51	-	-	-	-	0.93	0.94
2-methyl-1-Pentene	C_6H_{12}	84	29.89	-	-	-	-	3.38	3.74
ethyl-Cyclobutane	C_6H_{12}	84	30.01	0.67	1.02	1.04	-	-	-
1-Hexene	C_6H_{12}	84	30.2	-	-	-	-	9.80	11.2
1-ethyl-2-methyl-cis-Cyclopropane	C_6H_{12}	84	30.41	1.39	1.76	2.63	1.41	-	-
2-ethyl-1,3-Butadiene	C_6H_{10}	82	30.91	-	-		-	0.57	0.61
Benzene	C_6H_6	78	31.51	-	-	0.46	0.65	1.18	1.53
1,2-Cyclononadiene	C_9H_{14}	122	32.13	-	-	-	-	-	1.20
(Z)-1,4-Hexadiene	C_6H_{10}	82	32.39	-	-	-	-	0.53	0.81
(E)-1,3-Pentadiene, 2-methyl-	C_6H_{10}	82	32.69	-	-	-	-	0.65	0.97
trans-1,4-Hexadiene	C_6H_{10}	82	34.3	-	-	-	-	0.30	0.41

Table S9. FTIR band and functional group table of thermal and catalytic pyrolysis of BMP and CMP chars at 500, 550, and 600 °C.

Bond/ Functional Group	Thermal			Catalytic			Thermal			Catalytic		
	BMP Char			BMP Char			CMP Char			CMP Char		
	500 °C	550 °C	600 °C	500 °C	550 °C	600 °C	500 °C	550 °C	600 °C	500 °C	550 °C	600 °C
	wavenumber (cm-1)											
aromatic C–H stretching vibrations	-	-	-	645	645	-	650	657	657	650	-	655
=C–H Bend (Alkene)	713	718	715	-	-	-	-	713	-	714	716	714
=C–H Bending alkene	-	-	-	-	-	-	798	798	798	799	798	797
C-O-C stretching, cellulose, hemicellulose	873	874	874	874	874	874	874	874	874	875	874	874
C-O stretching, aromatic C-H in plane deformation, Cellulose, Lignin	1024	1045	1044	1045	10451	1045	1060	1053	1045	1059	1053	1056
C-H bending, C-H stretching in CH_3, cellulose, hemicellulose, lignin	1395	1398	1398	-	-	-	-	-	-	-	-	-
Symmetric CH_2 bending vibration, symmetric stretching band, cellulose,	1416	1409	1417	1417	1417	1417	1416	1417	1416	1417	1423	1417
C=C-C aromatic ring stretching and vibration, lignin	1568	1573	1574	-	1582	-	1584	1584	184	-	-	-
C-H stretching cellulose, hemicellulose, lignin	2914	2915	-	2914	2916	-	2916	2914	2916	2913	2914	-

Table S10. FTIR band and functional group table of bluegrass (BG), net wrap (NW), twine 1 (T1), twine 2 (T2), mixed plastic (MP), chaff mixed plastic (CMP), bluegrass mixed plastic (BMP).

Bond/ Functional Group	Raw Materials					Mix Materials		
	BG	Chaff	NW	T1	T2	MP	CMP	BMP
	wavenumber (cm^{-1})							
=C–H Bend (Alkene)	-	-	717	719	-	718	717	717
Aliphatic CH_2 Rocking	-	-	730	-	-	730	730	730
Aromatic Out of plane C–H bending	-	-	-	808	808	810	808	-
=C–H Bending Alkene	-	-	-	899	898	900	-	-
CH_2 wagging or twisting	-	-	-	972	972	973	-	-
=C–H bend alkenes	-	-	-	998	997	997	-	-
aromatic C-H in-plane deformation	-	1031	1034	-	-	-	1032	1034
C–C–H bending	1132	-	-	1101	1102	-	-	-
C-O-C stretching, cellulose, hemicellulose	1160	1157	-	-	-	-	1164	1165
C–H in-plane bending	1239	1231	-	-	-	-	-	-
CH_3 Symmetric bending	1369	1372	1376	1375	1375	1375	1375	1376
C–H in-plane wagging	-	-	1461	1455	1454	1462	1462	1465
–CH3 Bending	-	-	1471	-	-	1472	1471	1472
–C=C– stretch alkene	-	1634	-	1650	1650	-	1620	-
C=O stretch, α, β–unsaturated esters	1731	1731	-	-	-	-	1729	17.29
C–H symmetrical stretching from CH_2 from aliphatic chain	2850	2850	2848	2838	2837	2848	2848	2848
C–H Stretch Methyl (–CH_3)	-	-	-	-	2866	2866	-	-
C–H asymmetrical stretching from CH_2 from aliphatic chain	2919	2920	2914	2916	2916	2915	2915	2919
C–H asymmetrical stretching from CH_3 from aliphatic chain	-	-	-	2949	2949	2951	2952	2951
O–H stretching vibration, H–bonded, (alcohols, phenols)	3347	3346	3346	-	-	-	3337	3380

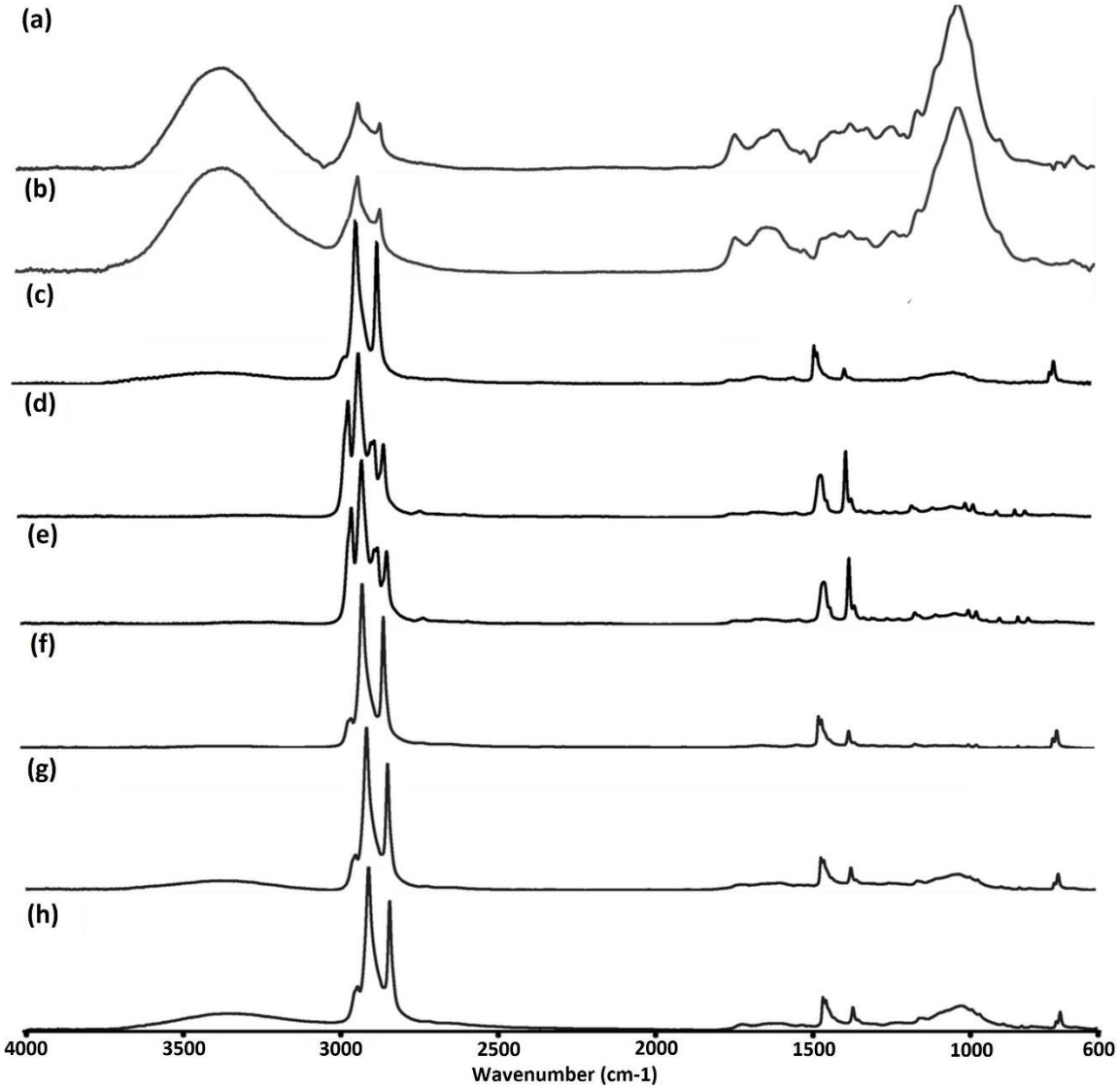

Figure S6. FTIR spectra of (a) bluegrass (BG), (b) chaff, (c) net wrap (NW), (d) twine 1 (T1), (e) twine 2 (T2), (f) mixed plastic (MP), (g) chaff mixed plastic (CMP), and (h) bluegrass mixed plastic (BMP).

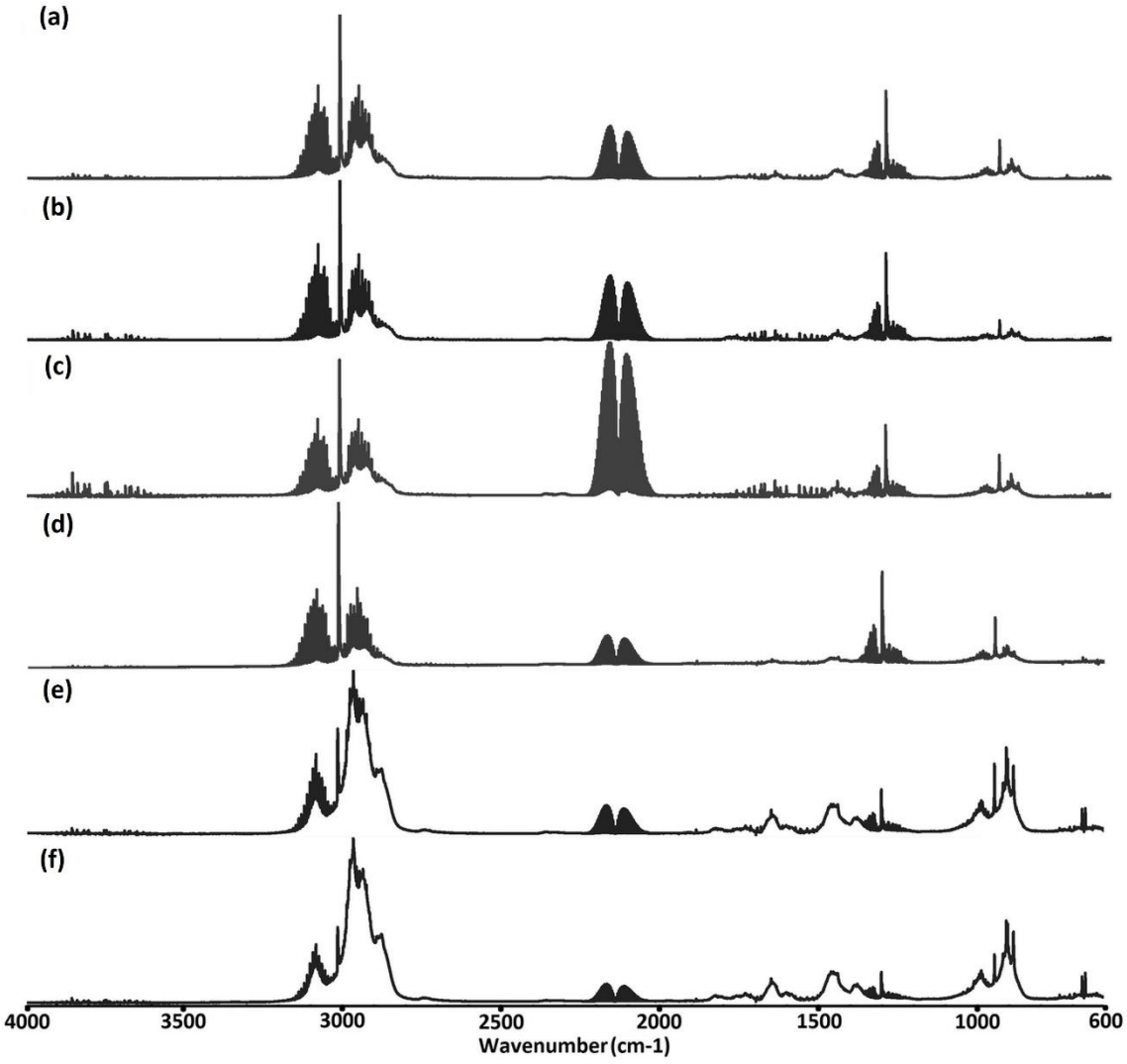

Figure S7. FTIR spectra of gas produced from the thermal pyrolysis of BMP at (a) 500 °C, (b) 550 °C, (c) 600 °C, and CMP at (d) 500 °C, (e) 550 °C, and (f) 600 °C.

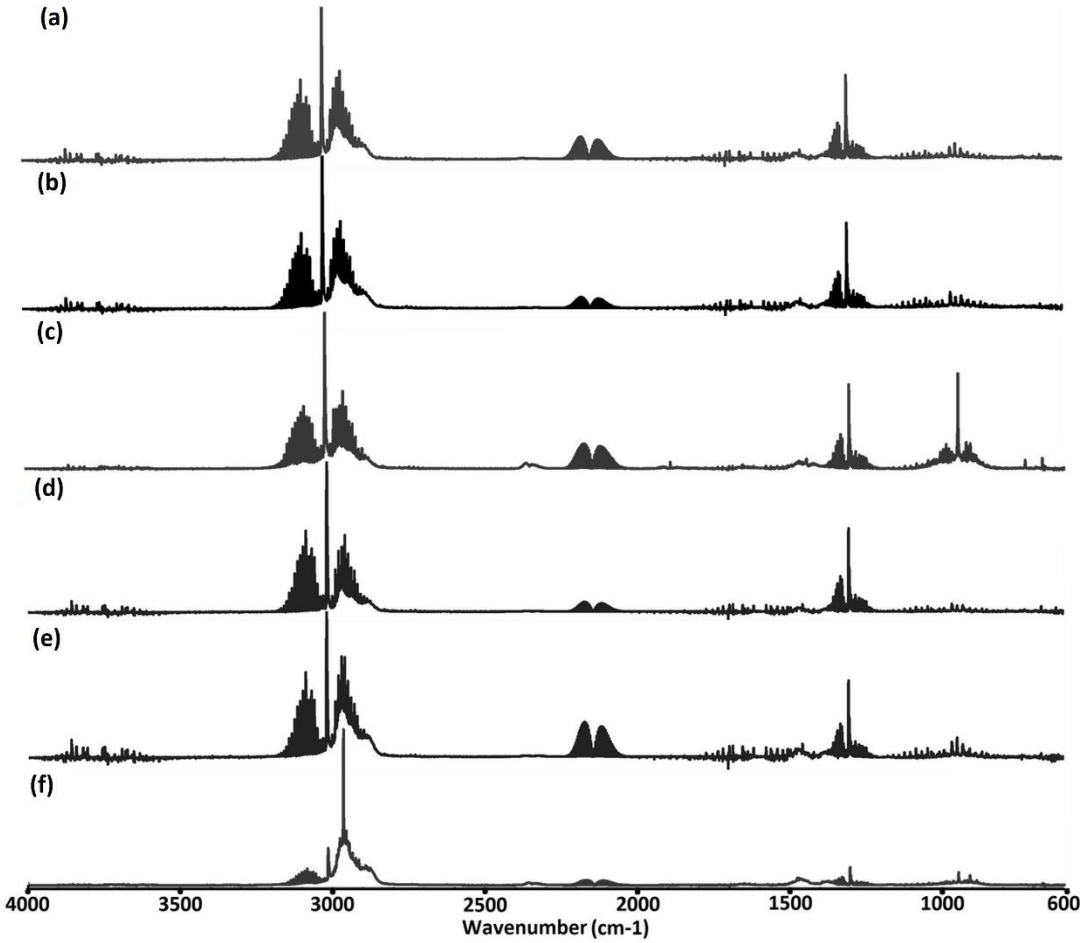

Figure S8. Gas FTIR spectra of catalytic pyrolysis of BMP at (a) 500 °C, (b) 550 °C, (c) 600 °C, and CMP at (d) 500 °C, (e) 550 °C, (f) 600 °C.

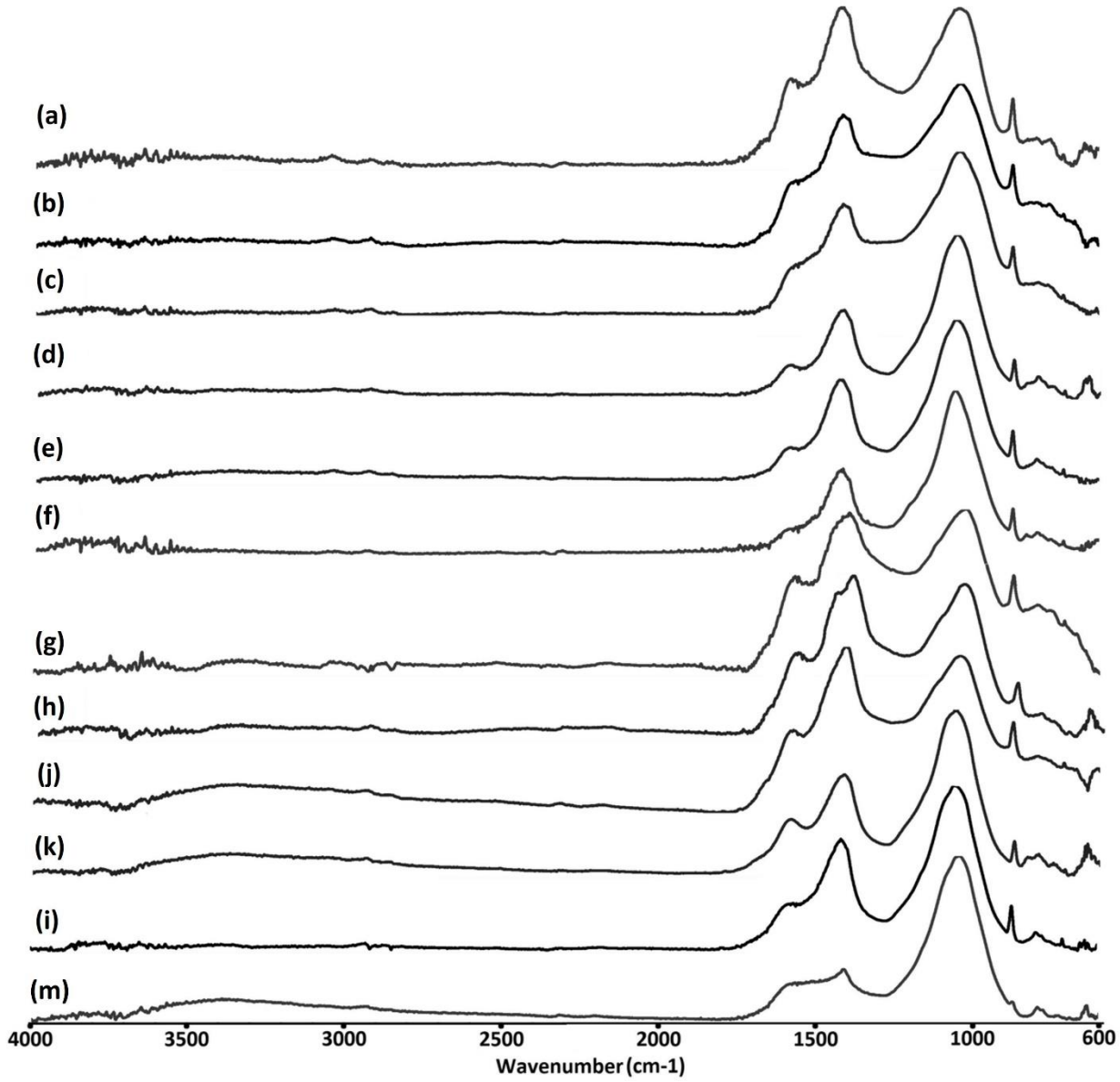

Figure S9. FTIR spectra of char from thermal pyrolysis of: BMP at (a) 500 °C, (b) 550 °C, (c) 600 °C; catalytic pyrolysis of BMP at (d) 500 °C, (e) 550 °C, (f) 600°C; thermal pyrolysis of CMP at (g) 500 °C, (h) 550 °C, (j) 600 °C; and catalytic pyrolysis of CMP at (k) 500 °C, (l) 550 °C, and (m) 600 °C.