

Table S1 Main compounds of bio-oil obtained from four HTL processes

Compound	Specific component	Peak area percentage /%			
		D2	C	S1-I	S1-II
Hydrocarbons	Dodecane, 1-iodo-	0.56	/	/	/
	10-Methylnonadecane	0.58	/	/	/
	1-Pentadecene	0.79	/	/	0.53
	Cholest-2-ene, (5.alpha.)-	0.51	0.93	/	1.46
	Cholest-3-ene, (5.alpha.)-	/	2.18	/	
	Cholestane	/	2.36	/	0.63
	1,5-Hexadiene, 3,3,4,4-tetrafluoro-	/	/	/	0.54
	Total	2.44	5.47	0.00	3.16
Alcohols	1-Tetradecanol	0.93	1.40	/	/
	Cholestan-3-ol, (3.beta.,5.beta.)-	/	/	1.78	/
	26-Nor-5-cholesten-3.beta.-ol-25-one	/	/	0.84	/
	dl-Erythro-1-phenyl-1,2-propanediol	/	/	/	0.51
	n-Heptadecanol-1	/	/	/	0.54
	n-Tridecan-1-ol	/	/	/	0.88
	Total	0.93	1.40	2.62	1.93
Esters	DL-Alanine, N-methyl-N-octyloxycarbonyl-, decyl ester	1.77	/	1.93	/
	Hexadecanoic acid, ethyl ester	1.82	1.06	/	1.53
	Tetradecanoic acid, hexadecyl ester	/	/	0.69	/
	Pipecolic acid, N-ethoxycarbonyl-, undecyl ester	/	/	/	1.10
	Propanoic acid, 3-chloro-, 4-formylphenyl ester	/	/	0.56	/
	Hexadecyl pentadecanoate	/	/	0.71	/
	Total	3.59	1.06	3.89	2.63
Acids	Pentadecanoic acid	0.59	/	0.62	0.79
	Tetradecanoic acid	0.69	/	0.63	0.86
	Dodecanoic acid	1.05	1.00	1.39	1.29
	n-Hexadecanoic acid	2.28	0.99	6.90	2.73
	2-Hydroxy-3-phenylbenzoic acid	/	2.19	/	/
	Octanoic acid	/	/	0.57	/
	Hexanoic acid	/	/	0.91	/
	cis-13-Octadecenoic acid	/	/	1.10	/
	3-Pentenoic acid, 4-methyl-	/	/	/	0.52
	Total	4.61	4.18	12.12	6.19
Phenols	2,4-Di-tert-butylphenol	0.63	0.75	0.64	0.60
	Phenol, 2-methoxy-	0.76	0.68	/	1.63
	Phenol, 2-methyl-	0.95	0.80	/	0.64
	Phenol, 2,4-bis(1,1-dimethylethyl)-, phosphite (3:1)	1.08	0.95	/	/
	Phenol, 4-ethyl-	2.08	1.93	/	3.07
	Phenol	4.59	4.27	/	6.70
	p-Cresol	5.12	4.77	/	6.52
	1-Naphthol, 5,7-dimethyl-	/	0.54	/	/
	Phenol, 4-ethyl-2-methoxy-	/	/	/	0.73
	2-Methoxy-5-methylphenol	/	/	/	0.74
	Total	15.21	14.69	0.64	20.63
Ketones	3,4-Diethoxy-3-cyclobutene-1,2-dione	0.87	1.79	/	3.76
	2-Cyclopenten-1-one, 3-methyl-	0.90	0.76	/	0.93
	2-Cyclopenten-1-one, 2-methyl-	1.20	1.14	/	0.74
	2-Cyclopenten-1-one, 2,3-dimethyl-	/	0.79	/	0.84
	2-Cyclopenten-1-one, 3-ethyl-2-hydroxy-	/	/	0.60	/
	Cholestan-3-one	/	/	0.64	/
	14-Heptacosanone	/	/	1.54	/
	1,2-Cyclopentanedione, 3-methyl-	/	/	4.64	/
	Acetyl iodide	/	/		0.59
	Total	2.97	4.48	7.42	6.86
Other oxygen-containing compounds	4,4'-(1,3-Dimethylbutylidene)bisphenol, bis(trifluoroacetate)	0.67	/	/	/
	3-Hydroxybutanal, TBDMS derivative	/	/	0.56	/
	Furan, 2-methyl-5-(methylthio)-	/	/	0.58	/
	5-Hydroxymethylfurfural	/	/	0.69	/
	2-Furancarboxaldehyde, 5-methyl-	/	/	2.51	/
	Silane, diethylheptyloxyoctadecyloxy-	/	/	1.65	0.55
	Total	0.67	0.00	5.99	0.55
/Nitrogen-containing compounds	N-Methyldodecanamide	0.53	/	/	/
	Caprolactam	0.54	0.54	/	0.91
	Pyridine, 3-phenyl-	0.55	0.53	/	0.64

3-Ethyl-1H-indole	0.56	/	/	/
Quinoline, 8-methyl-	0.60	/	/	/
N-Ethyl-p-toluidine	1.25	0.59	/	/
1H-Indole, 2,3-dimethyl-	0.63	0.57	/	0.56
N-Isopentylpalmitamide	0.64	/	/	/
2,5-Pyrrolidinedione, 1-methyl-	0.66	0.60	/	0.52
1,7-Trimethylene-2,3-dimethylindole	0.68	/	/	/
Pyrazine, 2-ethyl-6-methyl-	0.73	/	/	/
2-Oxo-1-methyl-3-isopropylpyrazine	0.80	1.00	/	/
Pyrrolo[1,2-a]pyrazine-1,4-dione, hexahydro-3-(phenylmethyl)-	0.82	1.47	3.26	0.65
3,6-Diisopropylpiperazin-2,5-dione	2.76	4.71	0.93	1.75
Hexadecanamide	1.04	/	0.55	/
3-Aminopyridine	1.15	1.62	/	0.92
Hexahydro-3-(1-methylpropyl)pyrrolo[1,2-a]pyrazine-1,4-dione	1.38	1.86	3.24	/
1H-Indole, 2-methyl-	1.47	1.44	/	1.99
Pyridine, 2-ethyl-5-methyl-	1.50	1.33	/	1.10
9H-Pyrido[3,4-b]indole, 1-methyl-	1.63	2.09	/	1.81
Phenol, 4-amino-	1.80	/	/	/
2-Pyrrolidinone	2.10	2.06	/	0.84
Cyclo(L-prolyl-L-valine)	2.22	3.11	3.22	1.75
9H-Pyrido[3,4-b]indole	2.68	4.00	/	3.73
Indole	2.78	2.54	/	4.35
Octahydrodipyrrolo[1,2-a:1',2'-d]pyrazine-5,10-dione-, (5aR,10aR) (isomer 1)	3.76	4.43	/	2.76
2-Pyrrolidinone, 1-methyl-	4.21	2.33	/	1.33
Phe-Leu-OH	/	0.52	2.25	0.65
N-(1-Naphthylmethylene)aniline	/	0.56	/	/
Pyrrolidine, 1-acetyl-	/	0.58	/	/
1-Ethyl-2-pyrrolidinone	/	0.62	/	/
1-[2-(1H-Indol-1-yl)ethenyl]-1H-indole	/	0.65	/	/
2-Piperidinone	/	1.24	/	1.26
Dodecanamide	/	0.71	/	/
Pyrrolo[1,2-a]pyrazine-1,4-dione, hexahydro-3-(2-methylpropyl)-	/	0.74	5.56	0.55
Pipecolic acid, N-ethoxycarbonyl-, dodecyl ester	/	/	0.51	/
Brevianamide F	/	/	0.51	/
1H-Pyrrole-2-carboxaldehyde, 1-methyl-	/	/	0.51	/
Acetamide, N-3-pyridinyl-	/	/	0.60	/
Cyclo(alanylleucyl)	/	/	2.21	/
2,5-Piperazinedione, 3-methyl-6-(phenylmethyl)-	/	/	0.62	/
2,5-Piperazinedione, 3-benzyl-6-isopropyl-	/	/	2.23	0.65
3-Methyl-2,3,6,7,8,8a-hexahydropyrrolo[1,2-a]pyrazine-1,4-dione	/	/	1.37	/
1H-Pyrrole-2-carboxaldehyde	/	/	1.68	/
dl-Proline	/	/	5.21	/
Acetamide, N-(5-methoxy-2-pyrimidinyl)-	/	/	1.25	/
2-Butylamine, N-octyl-	/	/	1.85	/
Quinoline, 4-methyl-	/	/	/	0.82
13-Docosenamide, (Z)-	/	/	/	0.85
3-Acetamidocarbazole	/	/	/	0.89
Piperidine, 1-(2-phenylethyl)-	/	/	/	1.14
2-Butanone, 4-(1-piperidinyl)-	1.32	/	/	/
Total	40.79	42.44	37.56	32.42
In total	71.21	73.72	70.24	74.37

‘/’ means no data can be provided (namely zero value).