

Table S 1. Detailed composition of tar and HHV of tar compounds

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	Compound Type (synonyms for some compound names is provided)	HHV (kJ/mol)	HHV Calculation method	Chamise	Cham- ise Twig	Manzanita	Manzanita twig	Scrub Oak	Ceanothus	Sparkleberry
1	Pyridine	-2582.5	NIST	2.08%*	0.00%	0.00%	0.00%	2.46%	0.00%	0.00%
2	p-Benzoquinone	-2746.2	NIST	0.00%	2.57%	0.00%	0.00%	0.00%	0.00%	0.00%
3	Phenol	-3053.9	NIST	40.66%	31.56%	10.45%	18.30%	34.48%	27.22%	33.58%
4	Benzene, 1-ethyl-3- methyl	-5208.7	NIST	0.00%	0.00%	0.00%	0.00%	0.00%	2.23%	0.00%
5	Phenol, 2-methyl-	-3694.2	NIST	3.25%	2.88%	2.14%	6.15%	2.84%	7.35%	6.18%
6	Phenol, 3-methyl-	-3694.2	NIST	13.33%	12.88%	1.12%	5.49%	11.64%	13.32%	13.82%
7	3-Hydroxyphenyla- cetylene	-3819.6	Dulong-Berthelot	0.00%	1.76%	0.00%	0.00%	0.00%	0.00%	0.00%
8	Benzofuran, 2,3-dihy- dro-	-3906.2	NIST	6.45%	8.04%	3.08%	3.59%	17.38%	9.51%	5.57%
9	Hydroquinone(1,4- Benzenediol, Ben- zene-1,4-diol, Quinol)	-2856.5	NIST	4.47%	2.21%	0.00%	0.00%	0.00%	0.00%	0.00%
10	Quinoline	-4401.5	NIST	4.71%	2.51%	0.00%	0.00%	4.53%	6.19%	2.49%
11	Phenol,4-ethyl-2- methoxy(4-Ethyl guaiacol)	-4799.9	Dulong-Berthelot	1.74%	1.75%	0.00%	0.00%	0.00%	0.00%	5.92%
12	Indolizine	-983.6	Dulong-Berthelot	2.36%	2.01%	2.95%	5.84%	0.00%	0.00%	2.19%
13	1-Heptatriacotanol	-25665	Dulong-Berthelot	0.00%	1.45%	6.94%	5.49%	4.25%	7.37%	1.13%
14	2-[4-methyl-6-(2,6,6- trimethylcyclohex-1- enyl)hexa-1,3,5-tri- enyl]cyclohex-1-en-1- carboxaldehyde	-13629.3	Dulong-Berthelot	0.00%	0.00%	2.37%	6.07%	0.00%	0.00%	0.00%

15	Acenaphthylene	-6053.4	NIST	0.00%	0.00%	0.00%	0.00%	0.00%	3.62%	0.00%
16	6,7-Epoxy pregn-4-ene-9,11,18-triol-3,20-dione, 11,18-diacetate	-14459.9	Dulong-Berthelot	3.32%	4.94%	2.88%	2.00%	4.95%	4.34%	2.41%
17	Ethyl iso-allocholate	-16421	Dulong-Berthelot	2.21%	1.76%	4.58%	2.46%	1.37%	2.00%	2.06%
18	Phorbol	-10411.2	Dulong-Berthelot	0.00%	3.61%	34.09%	16.41%	2.72%	0.00%	1.31%
19	5H-Cyclopropa[3,4]benz[1,2-e]azulen-5-one, 9a-(acetyloxy)-1,1a,1b,4,4a,7a,7b,8,9,9a-decahydro-4a,7b,9-trihydroxy-3-(hydroxymethyl)-1,1,6,8-tetramethyl-, [1aR-(1aa,1bβ,4aβ,7aa,7ba,8a,9β,9aa)]-	-12554.6	Dulong-Berthelot	0.00%	0.00%	8.78%	11.19%	0.00%	0.00%	0.00%
20	Fluoranthene	-7926.7	NIST	3.76%	6.96%	19.28%	7.77%	8.49%	9.18%	6.82%
21	9,10-Ethanoanthracene, 9,10-dihydro-11,12-diacetyl-	-10124.2	Dulong-Berthelot	11.64%	13.70%	1.35%	9.21%	4.88%	6.30%	16.51%

* All reported numbers as concentration of tar compounds are mole% of detected tar.

**NIST is from [38] and Dulong-Berthelot is model 5 from [39]

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Table S 2. Detailed classification of tar compounds

Compound Type (synonyms for some compound names is provided)		Ar/Non-Ar	Compound Type	Oxy/Non-oxy	Branch/ Non-Branched
1	Pyridine	Ar	Non-Benzenoid Ar	N	N
2	p-Benzoquinone	Non-Ar	Cyclo-alkene	Y	Y
3	Phenol	Ar	Benzenoid Ar	Y	Y
4	Benzene, 1-ethyl-3-methyl	Ar	Benzenoid Ar	N	Y
5	Phenol, 2-methyl-	Ar	Benzenoid Ar	Y	Y
6	Phenol, 3-methyl-	Ar	Benzenoid Ar	Y	Y
7	3-Hydroxyphenylacetylene	Ar	Benzenoid Ar	Y	Y
8	Benzofuran, 2,3-dihydro-	Ar	Benzenoid Ar	Y	N
9	Hydroquinone(1,4-Benzenediol, Benzene-1,4-diol, Quinol)	Ar	Benzenoid Ar	Y	Y
10	Quinoline	Ar	Benzenoid Ar	N	N
11	Phenol,4-ethyl-2-methoxy(4-Ethyl guaiacol)	Ar	Benzenoid Ar	Y	Y
12	Indolizine	Ar	Heterocyclic	N	N
13	1-Heptatriacotanol	Non-Ar	Alcohol	Y	N
14	2-[4-methyl-6-(2,6,6-trimethylcyclohex-1-enyl)hexa-1,3,5-trienyl]cyclohex-1-en-1-carboxaldehyde	Non-Ar	Cyclo-alkene	Y	Y
15	Acenaphthylene	Ar	PAH	N	N
16	6,7-Epoxypregn-4-ene-9,11,18-triol-3,20-dione, 11,18-diacetate	Non-Ar	Cyclo-alkene	Y	Y
17	Ethyl iso-allocholate	Non-Ar	Cyclo-alkane	Y	Y
18	Phorbol	Non-Ar	Cyclo-alkene	Y	Y

19	5H-Cyclopropa[3,4]benz[1,2-e]azulen-5-one, 9a-(acetyloxy)-1,1a,1b,4,4a,7a,7b,8,9,9a-decahydro-4a,7b,9-trihydroxy-3-(hydroxymethyl)-1,1,6,8-tetramethyl-, [1aR-(1aa,1bβ,4aβ,7aa,7ba,8a,9β,9aa)]-	Non-Ar	Cyclo-alkene	Y	Y
20	Fluoranthene	Ar	PAH	N	N
21	9,10-Ethanoanthracene, 9,10-dihydro-11,12-diacetyl-	Ar	PAH	Y	Y