

Supplementary material

Catalytic Microwave-Assisted Pyrolysis of the Main Residue of the Brewing Industry

Fernanda Pimenta, Elmis Filho, Ângelo Diniz and Marcos A. S. Barrozo *

Chemical Engineering School, Federal University of Uberlândia, Uberlândia 38408-100, Brazil

* Correspondence: masbarrozo@ufu.br; Fax: +55-34-32394188

Table S1. % Area from GC/MS results for the liquid product from the CCD runs of the catalytic MAP.

Compound	Run									
	1	2	3	4	5	6	7	8	9	10
Phenol, 4-methyl-	6.24	5.81	5.35	3.06	4.72	5.22	5.64	6.27	6.36	4.58
Phenol	5.78	5.35	5.66	1.79	0.46	4.81	4.66	6.05	5.35	4.16
Phenol, 2-methyl-	2.28	4.4	4	3.8	2.43	4.03	4.25	4.52	5.07	4.39
Phenol, 2,3-dimethyl-	1.87	1.78	1.53	1.62	0.97	1.69	1.81	1.74	1.97	1.73
Indene	1.76	1.95	3.81	2.16	3	3.65	1.97	2.96	3.29	2.05
1-Tridecene	1.65	1.87	2.61	1.47	1.86	2.66	3.17	1.48	3.05	1.86
Hexadecanenitrile	1.51	1.9	1.49	1.57	2.13	1.75	2.16	1.53	1.28	1.61
1-Dodecene	1.46	1.57	1.33	1.48	0.95	1.29	1.75	1.5	1.38	1.57
Hexadecanoic acid, methyl ester	1.37	1.66	0.98	2.35	1.62	1.41	1.7	1.09	1.1	1.4
Naphthalene, 1-methyl-	1.34	4.14	4.63	1.75	0.8	5.07	3.3	3.88	6.38	4.94
Styrene	1.34	1.1	3.44	2.88	2.3	2.99	2.58	3.33	1.55	1.48
Benzene, pentyl-	1.2	1.12	0.84	1.23	1.08	0.84	1.14	0.84	1.01	1.16
1-Undecene	1.17	1.15	1.03	1.44	0.84	0.33	1.65	1.27	0.91	1.11
Toluene	0.99	0.88	3.62	5.17	4.44	3.86	4.45	4.38	0.56	0.99
Octadecanoic acid, 2-propenyl ester	0.99	0.79	0.76	0.92	3.37	0.74	0.72	0.84	0.89	0.94
o-Xylene	0.66	0.67	2.51	3.29	0.66	2.76	3.15	2.98	0.55	0.7
2-Nonadecanone	4.16	4.67	3.24	1.59	0	1.89	5.33	3.32	3.38	4.52
Pentadecane	3.88	7.31	2.93	3.72	4.69	3.16	3.37	0	3.96	4.58
Hexadecane	2.61	0.88	1.43	0.7	1.85	0	3.35	4.7	1.28	4.93
Pyrrole	2.23	1.6	2.22	1.63	0	1.65	2.43	3.8	0.43	0.8
1H-Indene, 1-methyl-	1.61	0.76	1.88	1.56	0	1.8	1.64	0.66	3.44	0.99
Phenol, 2-methoxy-	1.51	0.96	0.72	1.06	0.95	0.72	0.81	0	0.77	0.79
Dodecane	1.11	1.39	0.79	2.01	0	1.02	1.5	0.75	0.68	1.35
Undecane	0.75	0.88	0.59	1.99	0	0.73	1.19	0.69	0.59	0.87
Azulene	5.41	0	9.19	4.68	3.54	7.64	0	6.3	10.55	6.88
Benzyl nitrile	1.25	0.62	0.68	1.03	0.8	1.28	0	0	0.89	0.74
Tetradecane	0.72	1.03	0.6	2.25	0.71	2.97	0	0.57	1.86	0
Biphenylene	0	0.88	1.22	0.8	0.94	1.43	0	0.46	1.6	1.41
2-Methoxy-4-vinylphenol	5.05	3.46	0	1.76	7.68	3.76	3.01	0	0	4.46
Indole	2.36	2.67	0	2.37	1.95	3.16	0	2.77	3.49	0
Tetradecanamide	1.33	1.36	1.74	1.54	2.62	1.66	1.15	0	0	0

Ethylbenzene	0.86	0	1.39	2	1.64	1.32	1.6	1.79	0	0
Benzene, butyl-	0.68	0	0	0.89	0.64	0	0.6	0.5	0.42	0.6
2-Cyclopenten-1-one, 2,3-dimethyl-	0	1.49	1.32	0.89	0	0.93	1.36	0	0.87	0.96
1H-Indole, 3-methyl-	0	0.83	0	2.84	0.72	0.85	0	0.46	0.47	0.92
Benzene, 2-propenyl-	0	0	1.26	0.75	0	0.77	0.54	1.24	0.6	0.73
1-Pentadecene	2.22	3.22	0	3.33	0	0.77	0	0	0.52	1.12
Benzene, heptyl-	0.75	0.89	0	0.78	0.7	0	0	0	1.03	0.85
Benzene, (1,3-dimethylbutyl)-	0.7	0.79	0	0.69	0	0	0.55	0	0.56	0.73
2-Cyclopenten-1-one, 2-methyl-	1.49	1.05	0.75	0	0	0	0.97	1.25	0	0
Benzene, hexyl-	0.76	0.78	0	0.78	0.71	0	0	0	0	0.82
8-Heptadecene	0	1.04	0	0.88	1.16	0.69	0	0	0	1.48
Benzene, 1-ethenyl-3-methyl-	0	0	0.76	0	0	0.75	0.55	0.71	0.61	0
Benzene, 1,2,3-trimethyl-	0	0	0.65	0	0	0.77	0.99	0.84	0	0.67
1-Decene	0	0	0.62	1.99	0.71	0	1.04	0.87	0	0
2-Furanmethanol	2.14	1.15	1.16	0	0	0	0	1.84	0	0
Cyclopropylphenylmethane	0.81	0	0.6	0	0	0	0.67	0	0	0.71
Phenol, 2-methoxy-4-methyl-	0.75	0	0	0.69	0.83	0	0	0	0.61	0
Benzonitrile	0.68	0	1.34	0	0	0.97	0	0	0.97	0
Benzylmalonic acid	0	0.77	0	0	0	0.59	0	0.63	0.69	0
Biphenyl	0	0	1.13	0	0	1.4	0	0	1.81	0.69
Isoquinoline	0	0	0.83	0	0	0.65	0	0.55	0.98	0
Decane	0	0	0	0.84	0	0.57	1.05	0.66	0	0
Benzene, 1-ethyl-2-methyl-	0	0	0	0.7	0	0.68	0.68	0.6	0	0
2-Cyclopenten-1-one, 3-methyl-	0.9	0.68	0	0	0	0	0	0.83	0	0
2,4-Hexadiene, 2,3-dimethyl-	0.76	0.73	0	0	0	0.86	0	0	0	0
2-Decanone	0.73	0.79	0	0	0	0	0	0	0	0.67
Benzene,1-methyl-1,2-propadienyl-	0	1.02	0	0	0	0	0	0	0.77	2.38
Phenol, 2-methoxy-4-(1-propenyl)-, (E)-	0	0.72	0	0.79	0.9	0	0	0	0	0
5H-1-Pyridine	0	0	2.9	0	0	0	2.59	0	0	5.26
Benzene, 1-butyryl-	0	0	1.07	0	0	1.06	0	0.52	0	0
Anthracene	0	0	0.9	0	0	0.73	0	0	0.93	0
Benzene, (cyclopropylidenemethyl)-	0	0	0.68	0	0	0.59	0	0.62	0	0
9,12-Octadecadienoic acid, methyl ester	0	0	0	0.83	1.05	0	0.48	0	0	0
Benzene, propyl-	0	0	0	0.75	0	0	0.5	0.6	0	0
Octadecanamide	0	0	0	0	0	0	0	1.43	1.14	1.38
1-Methyl-2-methylenecyclohexane	0.86	0.8	0	0	0	0	0	0	0	0
1-Hexadecanol	0.76	0	0	0	0	0	0	0	0	0.63
Ethanone, 1-(2-furanyl)-	0.74	0	0	0	0	0	0	0.55	0	0
2-Nonenal, (E)-	0	6	0	0	0	0	0	0	0	5.97
Ethanone, 1-cyclododecyl-	0	0.79	0	0	0	0	0	0	0	0.68
n-Hexadecanoic acid	0	0	0.87	0	6.64	0	0	0	0	0
4-Octyne	0	0	0.76	0	0	0	1.06	0	0	0
Phenol, 4-ethyl-2-methoxy-	0	0	0	2.78	2.57	0	0	0	0	0
1-Nonene	0	0	0	0.71	0	0	0.74	0	0	0

[illegible]