
Analytical Report	
Title	**Pepper Black** Essential Oil Profile by GC-MS
Report No.	SE-37270-23
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Notebook reference	III-29-75
Contributors:	
Quote No.	
Requester	Blue World Naturals LLC

Primary Aim

To identify GC amendable volatile organic compounds present in submitted **Cardamom** essential oil sample.

Samples

The sample arrived as clear liquid with characteristic odor labeled as "Pepper Black lot 11111-a18".

Experimental:

1. Oil was dissolved in methanol to concentration of ~0.1%, 1 ul injected into the GC injector port.

2. GC conditions:

Injector temperature:	250 C
Initial oven temperature:	80 C
Ramp	10 C/min
Final temperature	220 C
Final temperature hold	5 min

3. MS parameters

Ionization and ion polarity	EI+
Scan rate	2 scans/sec
Mass range	35-350 Da
Ion source temperature	150C
Transfer line temperature	280C

4. GC-MS analysis. Waters/Micromass Quatro GC mass spectrometer interfaced to a ThermoElectron Trace gas chromatograph was utilized for the analysis. 30m 0.25 mm ID DB-5 column was used to separate components. Carrier gas was helium at 1.1 ml/min with split ratio of 50.

5. Data treatment.
For each sample, a set of target components was identified with the aid of the AMDIS software[1].The components were identified using the NIST mass spectral library[2].

Deliverables

1. GC-MS chromatogram. GC-MS chromatogram is shown in Appendix I.

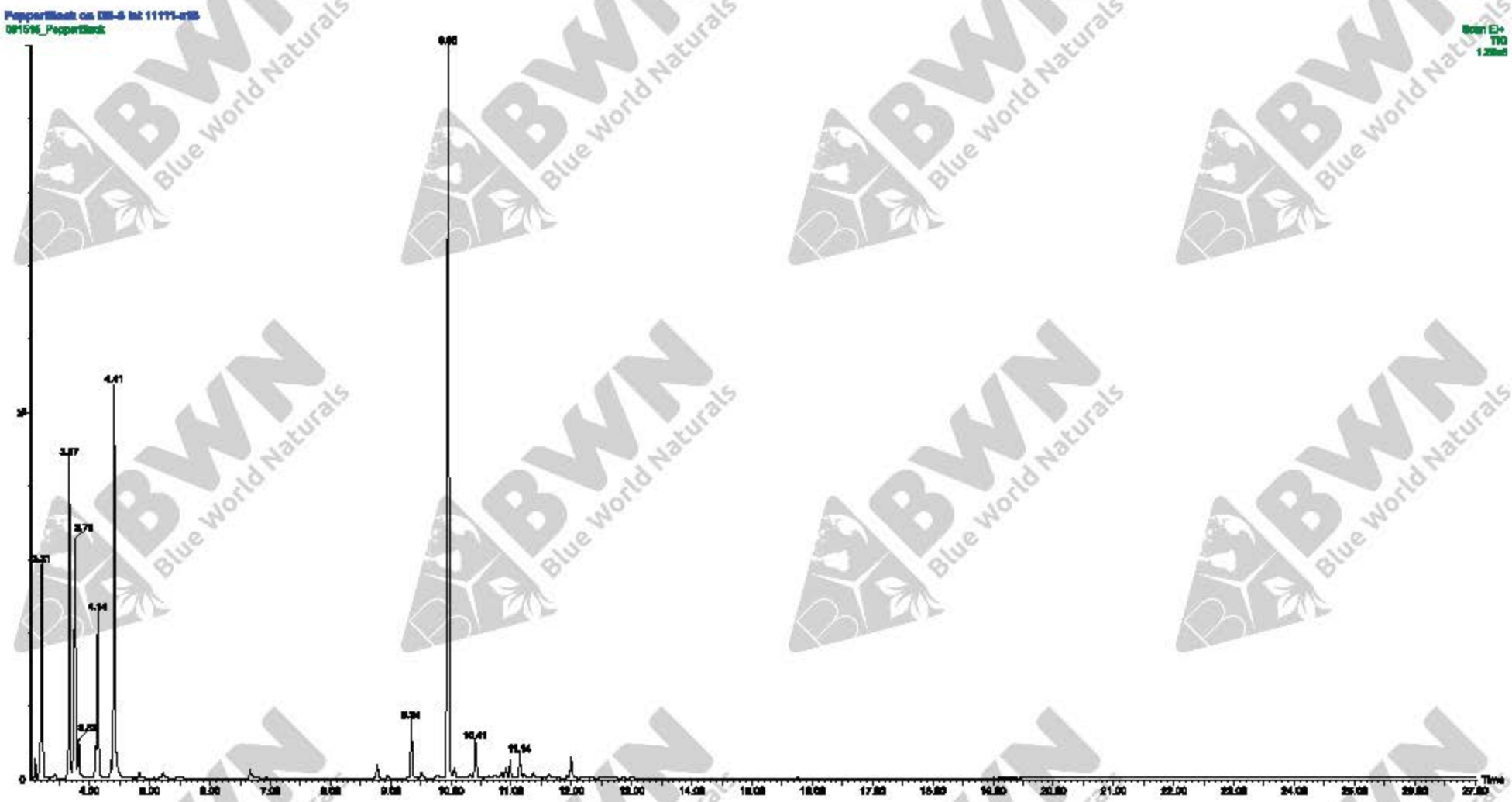
2. Appendix II lists library search results.

- RT Retention Time, time in minutes at which the compound elutes out of column
- CAS. CAS registry number or EPA number.
- Name. IUPAC or common name of identified compound.
- Area. Peak area of a component in %% to total ion count

1 http://chemdata.nist.gov/mass-spc/amdis/
2 http://www.nist.gov/srd/nistla.cfm

APPENDIX I
Pepper Black
GC-MS Chromatogram

Sample “Pepper Black”



APPENDIX II
Pepper Black
Identified Compounds

Pepper Black

CAS	Name	R.T.	Area
28634-89-1	Thujene	3.08	0.6
80-56-8	alpha-pinene	3.187	9.1
79925	Camphene	3.405	0.2
3387415	Bicyclo[3.1.0]hexane, 4-methylene-1-(1-methylethyl)-	3.647	10.8
127913	beta-Pinene	3.739	10.1
123353	ß-Myrcene	3.799	1.5
99832	α-Phellandrene or isomer	4.082	1.0
99832	α-Phellandrene or isomer	4.088	1.1
2437958	Bicyclo[3.1.1]hept-2-ene, 2,6,6-trimethyl-, (±)-	4.119	5.6
527844	Benzene, 1-methyl-2-(1-methylethyl)-	4.337	0.6
138863	Limonene	4.392	13.9
555102	ß-Phellandrene	4.429	0.7
470826	Eucalyptol	4.468	0.2
99854	1,4-Cyclohexadiene, 1-methyl-4-(1-methylethyl)-	4.801	0.3
99805900	Cyclohexene, 4-methyl-3-(1-methylethylidene)-	5.204	0.2
562743	3-Cyclohexen-1-ol, 4-methyl-1-(1-methylethyl)-	6.65	0.4
20307840	Cyclohexene, 4-ethenyl-4-methyl-3-(1-methylethenyl)-1-(1-methylethyl)-, (3R-trans)-	8.761	0.6
17699148	α-Cubebene	8.925	0.1
3856255	Copaene	9.323	2.5
110823682	Cyclohexane, 1-ethenyl-1-methyl-2,4-bis(1-methylethenyl)-	9.492	0.2
28973979	1,6,10-Dodecatriene, 7,11-dimethyl-3-methylene-, (Z)-	9.734	0.1
118650	Bicyclo[7.2.0]undec-4-ene, 4,11,11-trimethyl-8-methylene-,[1R-(1R*,4Z,9S*)]-	9.936	34.4
17699-05-7	α-Bergamotene or isomer	10.042	0.4
6753986	α-Caryophyllene	10.39	1.7
23986745	1,6-Cyclodecadiene, 1-methyl-5-methylene-8-(1-methylethyl)-, [s-(E,E)]-	10.71	0.1
473132	Naphthalene, 1,2,3,4,4a,5,6,8a-octahydro-4a,8-dimethyl-2-(1-methylethenyl)-, [2R-(2α,4aα,8aß)]-	10.821	0.3
22567175	Azulene, 1,2,3,3a,4,5,6,7-octahydro-1,4-dimethyl-7-(1-methylethenyl)-, [1R-(1α,3aß,4α,7ß)]-	10.893	0.3
495614	Cyclohexene, 1-methyl-4-(5-methyl-1-methylene-4-hexenyl)-, (S)-	10.963	0.6
483761	Naphthalene, 1,2,3,5,6,8a-hexahydro-4,7-dimethyl-1-(1-methylethyl)-, (1S-cis)-	11.124	0.9
483772	Naphthalene, 1,2,3,4-tetrahydro-1,6-dimethyl-4-(1-methylethyl)-, (1S-cis)-	11.187	0.1
502998	1,3,7-Octatriene, 3,7-dimethyl-	11.353	0.2
142507	1,6,10-Dodecatrien-3-ol, 3,7,11-trimethyl-, [S-(Z)]-	11.608	0.2
1139306	Caryophyllene oxide	11.98	1.0
36564428	1-Naphthalenol, 1,2,3,4,4a,7,8,8a-octahydro-1,6-dimethyl-4-(1-methylethyl)-, [1S-(1α,4α,4aß,8aß)]-	12.688	0.1