

Date : October 6, 2016

SAMPLE IDENTIFICATION

Internal code : 16129

Customer identification : HE Ledum Groenlandicum - Batch No. CA-58578

Type : Essential oil

Source : *Ledum groenlandicum*

Customer : Nature's Gift

ANALYSIS

Method : PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French).

Analyst : Sylvain Mercier, M. Sc., chimiste

Analysis date : 2016-10-04

Checked and approved by :



Alexis St-Gelais, M. Sc., chimiste 2013-174

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IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
<i>cis</i> -Hex-3-en-1-ol	2.50	865	0.01	0.01	1343	4.93	Aliphatic alcohol
Tricyclene	3.16	913	0.13	0.12	925	0.78	Monoterpene
α -Thujene	3.25	918	0.64	0.91	951	0.88	Monoterpene
α -Pinene	3.38	926	4.75	4.63	946	0.86	Monoterpene
Unknown (m/z = 91, 92 (49), 65 (12)... 134? (2))	3.59	939	0.11	25.55	1064	1.56*	Monoterpene
Camphene	3.65*	942	1.71	1.75	996	1.07	Monoterpene
α -Fenchene	3.65*	942	[1.71]	0.06	983	1.01	Monoterpene
Thuja-2,4(10)-diene	3.74	947	0.02	[25.55]	1064	1.56*	Monoterpene
Sabinene	4.15	973	25.55	[25.55]	1064	1.56*	Monoterpene
β -Pinene	4.19	975	4.74	4.90	1040	1.37	Monoterpene
Myrcene	4.42	989	0.17	0.14	1112	1.96	Monoterpene
α -Phellandrene	4.68*	1004	0.29	0.23	1105	1.89	Monoterpene
Δ^3 -Carene	4.68*	1004	[0.29]	0.08	1089	1.76	Monoterpene
α -Terpinene	4.89	1015	2.07	2.05	1121	2.05	Monoterpene
Menthatriene analog A	5.02	1023	0.04	0.04	1179	2.73	Monoterpene
para-Cymene	5.08	1026	2.07	2.12	1205	3.03	Monoterpene
Limonene	5.11	1028	0.65	0.63	1137	2.24	Monoterpene
β -Phellandrene	5.14	1029	0.83	0.84	1143	2.31	Monoterpene
<i>cis</i> - β -Ocimene	5.28	1037	0.14	5.37	1188	2.83*	Monoterpene
<i>trans</i> - β -Ocimene	5.46	1047	0.06	0.08	1199	2.96	Monoterpene
γ -Terpinene	5.68	1060	5.12	[5.37]	1188	2.83*	Monoterpene
<i>cis</i> -Sabinene hydrate	6.00	1076	0.07	0.08	1403	5.80	Monoterp. alcohol
Terpinolene	6.12	1083	0.87	0.92	1221	3.23	Monoterpene
para-Cymenene	6.33	1094	0.10	0.08	1364	5.23	Monoterpene
Linalool	6.64	1107	0.09	0.17	1487	7.31	Monoterp. alcohol
Nonanal	6.69	1109	0.06	0.05	1335	4.81	Aliphatic aldehyde
Dehydrosabinaketone	7.12	1124	0.89	0.85	1524	8.04*	Normonoterp. ketone
<i>trans</i> -para-Mentha-2,8-dien-1-ol	7.17	1127	0.53	2.11	1562	9.15*	Monoterp. alcohol
<i>cis</i> -para-Menth-2-en-1-ol	7.23	1129	0.08	2.93	1503	7.60*	Monoterp. alcohol
<i>trans</i> -Pinocarveol	7.58	1142	1.61	[2.11]	1562	9.15*	Monoterp. alcohol
<i>trans</i> -para-Menth-2-en-1-ol	7.68	1146	0.11	0.09	1555	8.95	Monoterp. alcohol
Sabinaketone	8.01	1158	0.38	0.57	1584	9.79*	Normonoterp. ketone
Pinocarvone	8.11	1161	1.26	0.94	1465	6.89	Monoterp. ketone
Terpinen-4-ol	8.78*	1187	4.44	7.98	1529	8.19*	Monoterp. alcohol
Borneol	8.78*	1187	[4.44]	0.38	1622	10.95*	Monoterp. alcohol
Thuj-3-en-10-al	8.88	1190	1.40	1.53	1534	8.31	Monoterp. aldehyde
<i>trans</i> -para-Mentha-1(7),8-dien-2-ol	9.08	1197	0.05	0.06	1746	16.59	Monoterp. alcohol
Myrtenal	9.26	1201	3.28	[7.98]	1529	8.19*	Monoterp. aldehyde

α -Terpineol	9.37	1204	0.54	12.46	1638	11.59*	Monoterp. alcohol
γ -Terpineol	9.42	1205	0.29	[12.46]	1638	11.59*	Monoterp. alcohol
cis-para-Mentha-1(7),8-dien-2-ol	10.94	1239	0.06	0.07	1804	19.91	Monoterp. alcohol
Cuminal	11.20	1245	1.17	0.97	1676	13.29	Monoterp. aldehyde
Bornyl acetate	12.79	1280	3.03	[2.93]	1503	7.60*	Monoterp. ester
α -Terpinen-7-al	13.18	1288	0.14	0.11	1694	14.04	Monoterp. aldehyde
Cuminol	14.33	1308	0.14	0.15	2001	32.50	Monoterp. alcohol
Myrtenyl acetate	14.96	1318	0.07	0.07	1613	10.66	Monoterp. ester
δ -Elemene	15.15	1321	0.06	0.05	1411	5.92	Sesquiterpene
para-Mentha-1,4-dien-7-ol	16.31	1339	0.35	0.47	1956	29.84*	Monoterp. alcohol
α -Copaene	17.37	1355	0.20	0.20	1436	6.36	Sesquiterpene
β -Cubebene	18.34	1370	0.03	0.02	1478	7.13	Sesquiterpene
β -Elemene	18.60	1374	0.11	0.49	1531	8.22	Sesquiterpene
Geranyl acetate	19.31	1385	0.13	0.33	1701	14.37	Monoterp. ester
β -Caryophyllene	20.22	1398	0.13	[0.85]	1524	8.04*	Sesquiterpene
cis- α -Bergamotene	20.29	1399	0.03	0.04	1509	7.71	Sesquiterpene
γ -Elemene	21.53	1414	0.01	0.02	1576	9.58	Sesquiterpene
trans- α -Bergamotene	21.78	1417	0.04	0.06	1536	8.38	Sesquiterpene
cis-Muurolo-3,5-diene	22.58	1426	0.13	0.12	1552	8.86	Sesquiterpene
α -Humulene	23.01	1432	0.38	[0.57]	1584	9.79*	Sesquiterpene
allo-Aromadendrene	23.25	1435	0.36	[2.11]	1562	9.15*	Sesquiterpene
trans- β -Farnesene	24.20	1446	0.14	[0.38]	1622	10.95*	Sesquiterpene
Eudesma-2,4,11-triene?	24.77	1453	0.30				Sesquiterpene
Germacrene D	25.20	1458	0.10	[0.38]	1622	10.95*	Sesquiterpene
β -Selinene	26.19*	1470	12.27	[12.46]	1638	11.59*	Sesquiterpene
cis-Muurolo-4(14),5-diene	26.19*	1470	[12.27]	0.28	1615	10.75	Sesquiterpene
α -Selinene	26.58	1474	1.25	1.31	1641	11.73	Sesquiterpene
Eudesma-2,4(15),11-triene	27.20	1481	0.41	0.60	1651	12.19	Sesquiterpene
Germacrene A	27.38	1484	0.07	0.07	1688	13.79	Sesquiterpene
γ -Cadinene	28.29	1495	0.03	1.29	1667	12.89*	Sesquiterpene
β -Bisabolene	28.54	1498	1.48	1.45	1663	12.68	Sesquiterpene
δ -Cadinene	28.99	1504	0.97	[1.29]	1667	12.89*	Sesquiterpene
Zonarene	29.14	1506	0.11	[1.29]	1667	12.89*	Sesquiterpene
trans-Cadina-1,4-diene	30.04	1519	0.11	0.30	1698	14.22*	Sesquiterpene
trans- α -Bisabolene	30.92	1531	0.07	[0.30]	1698	14.22*	Sesquiterpene
Germacrene B	31.61	1540	0.21	0.26	1718	15.10	Sesquiterpene
γ -Calacorene	32.15	1547	0.22	0.22	1821	20.86	Sesquiterpene
Palustrol	32.75	1556	0.21	0.14	1829	21.34	Sesquiterp. alcohol
Unknown (m/z = 205, 43 (88), 41 (78), 67 (64), 91 (59), 109 (58), 69 (56), 93 (55), 55 (50)... 220(12))	35.10	1588	0.13				Sesquiterpene
Rosifoliol	35.25	1590	0.20	[0.47]	1956	29.84*	Sesquiterp. alcohol

Rosifoliol analog?	35.68	1597	0.64	0.60	2019	33.54	Sesquiterp. alcohol
Unknown (m/z = 159, 131 (66), 119 (32), 185 (31), 104 (30), 157 (28), 202 (28))	35.81	1600	0.20	0.20	1899	26.13	Sesquiterpene
1,10-diepi-Cubenol	36.23	1610	0.14	0.09	1944	29.10	Sesquiterp. alcohol
1-epi-Cubenol	36.40	1614	0.28	[0.47]	1956	29.84*	Sesquiterp. alcohol
Germacrone	38.94	1675	0.42	0.41	2078	36.13	Sesquiterp. ketone
Unknown (m/z = 41, 55 (91), 93 (90), 67 (84), 107 (80), 81 (78)... 220 (49))	39.14	1680	0.38				Oxygenated sesquiterpene
Unknown (m/z = 109, 67 (99), 93 (99), 81 (99), 107 (97), 41 (94), 55 (81), 220 (75))	40.29	1712	0.31				Oxygenated sesquiterpene
Cyclocolorenone	41.10	1737	0.81	0.89	2204	40.00	Sesquiterp. ketone
Eudesma-3,11-dien-2-one	42.44	1779	0.95	0.95	2347	43.40	Sesquiterp. ketone
Total identified			93%	92.74%			

*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

Note: no correction factor was applied

OTHER DATA

Physical aspect : Light yellow liquid

Refractive index : 1.4833 ± 0.0003 (20 °C)

CONCLUSION

No adulterant, contaminant or diluent were detected using this method.



