

CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF *PHOTINIA SERRULATA* L. FLOWERS

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Abstract

The chemical composition of the essential oil of *Photinia serrulata* L. flowers obtained by hydrodistillation was analyzed by GC/MS for the first time. The major compounds of the oil were found to be benzoic aldehyde (75.2%), docosane (4.0%), phenethyl alcohol (3.0%), pentacosane (1.3%) and benzyl alcohol (1.2%).

Photinia serrulata L. (Fam.: Rosaceae) native to China, is a large evergreen shrub or small tree in the genus *Photinia*. The plant is widely cultivated as an ornamental source and is also used as medicinal source to treat nephropathy, rheumatism and spermatorrhea (Hou *et al.* 2007). Many active compounds were isolated from *P. serrulata*. The chemical composition of essential oil of *P. serrulata* leaves was analyzed by GC/MS (Hou *et al.* 2007 and Zhou *et al.* 2011). In addition, the volatiles of *P. serrulata* flowers extracted by HS-SPME were analyzed by GC/MS (Wei *et al.* 2013). The present work was to investigate the chemical composition of the essential oil of *P. serrulata* flowers.

The fresh flowers of *P. serrulata* were subjected to hydrodistillation using a Clevenger-type apparatus for about 4 hrs. The oil was dried over anhydrous sodium sulfate.

GC/FID analyses of the oil were conducted using an Agilent 7890A GC equipped with a HP-5 MS column (30 m × 0.25 mm with a 0.25 µm film thickness). Injector temperature was 250°C. The oven temperature was started at 40°C, held for 3 min, and then raised to 160°C at 4°C/min, held for 3 min, and then programmed to 285°C at 6°C/min, held for 10 min. GC/MS analyses were performed using an Agilent 7890A GC coupled with a 5975C MSD under the same conditions for GC/FID. The ionisation energy was 70 eV. For linear retention indices calculation, a mixture of n-alkanes (C₆-C₄₀) was used under the same conditions for the analysis of the oil. Identification of the component was done by combination of RI, and MS data consisting of computer matching with NIST 98 libraries. Furthermore, some compounds were identified by comparing with authentic samples.

The detected compounds of the essential oil of *P. serrulata* are prepared in Table 1. The results showed that 39 compounds, representing 92.9% of the total oil, were identified from the oil. Aldehydes, alkanes and alcohols were found to be dominant components in the oil. On the contrary, fatty acids, terpenes, esters and ketones were the minor components in the oil. The highest compound in the oil was benzoic aldehyde (75.2%), followed by docosane (4.0%), phenethyl alcohol (3.0%), pentacosane (1.3%) and benzoic alcohol (1.2%). Obviously, benzoic aldehyde constituting over three-fourths of the total oil was the largest compound. According to the literature search, benzoic aldehyde was fairly common in plants of the Rosaceae family such as *Sorbus amabilis* (Cheng *et al.* 2015). The main volatile components from *P. serrulata* flowers by HS-SPME-GC-MS were benzoic aldehyde (63.9%), dehydromevalonic lactone (5.0%), phenylethyl alcohol (3.9%) and hexahydrofarnesyl acetone (2.2%) (Wei *et al.* 2013), which had some similarities with the main components of this current essential oil.

Table 1. Chemical composition of the essential oil of *Photinia serrulata* L. flowers.

No.	Compounds	RRI	Percentage	Identification
1	2-methyl-1-buten-4-ol	730	0.1	MS, RI
2	Toluene	763	0.2	MS, RI
3	Trans-2-hexenal	855	0.5	MS, RI
4	3-hexen-1-ol	858	0.7	MS, RI
5	Trans-2-hexen-1-ol	869	0.1	MS, RI
6	Hexyl alcohol	872	0.3	MS, RI
7	α -pinene	931	0.1	MS, RI
8	Benzoic aldehyde	971	75.2	MS, RI, Authentic compound
9	Benzoic alcohol	1043	1.2	MS, RI
10	1-nonanal	1108	0.1	MS, RI
11	Phenethyl alcohol	1120	3.0	MS, RI, Authentic compound
12	Camphor	1150	0.3	MS, RI
13	Benzoic acid	1198	0.3	MS, RI
14	Mandelonitrile	1342	0.2	MS, RI
15	2,6-di-tert-butyl-4-methylphenol	1503	0.1	MS, RI
16	Benzyl benzoate	1770	0.7	MS, RI
17	Perhydrofarnesyl acetone	1844	0.1	MS, RI
18	2-heptadecanone	1905	0.6	MS, RI
19	Dibutyl phthalate	1920	0.1	MS, RI
20	Heneicosane	2100	0.2	MS, RI, Authentic compound
21	2-nonadecanone	2106	0.1	MS, RI
22	Docosane	2200	0.1	MS, RI, Authentic compound
23	cis-9-tricosene	2274	0.1	MS, RI
24	Docosane	2304	4.0	MS, RI, Authentic compound
25	Tetracosane	2401	0.3	MS, RI, Authentic compound
26	1-heneicosanol	2475	0.2	MS, RI
27	Cembrane	2482	0.1	MS, RI
28	Pentacosane	2501	1.3	MS, RI, Authentic compound
29	Hexacosane	2600	0.1	MS, RI, Authentic compound
30	Heptacosane	2701	0.6	MS, RI, Authentic compound
31	1-hexacosene	2786	0.1	MS, RI
32	Octacosane	2801	0.2	MS, RI, Authentic compound
33	Nonacosane	2900	0.1	MS, RI, Authentic compound
34	Triacotane	3001	0.2	MS, RI, Authentic compound
35	Hentriacontane	3101	0.2	MS, RI, Authentic compound
36	Dotriacontane	3200	0.1	MS, RI, Authentic compound
37	Tritriacontane	3301	0.5	MS, RI, Authentic compound
38	Tetratriacontane	3402	0.2	MS, RI, Authentic compound
39	Pentatriacontane	3501	0.3	MS, RI, Authentic compound
	Total identified		92.9	

References

- Cheng MH, Bi SF, Lan YS 2015. Analysis of volatile oils from the different parts of *Sorbus amabilis* by GC-MS, West. Chin. J. Pham. Sci. **30**: 703-706.
- Hou J, Sun T, Hu J, Chen SY, Cai XQ, Zou GL 2007. Chemical composition, cytotoxic and antioxidant activity of the leaf essential oil of *Photinia serrulata*. Food Chem. **103**: 355-358.
- Wei JF, Yin ZH, Kang WY 2013. Volatiles from flowers of *Photinia serrulata* by HS-SPME-GC-MS, Chem. Nat. Comp. **49**: 354-356.
- Zhou Y, Ren XM, Wu YZ, Yin JG 2011. Chemical compositions of the volatile oil extracted from *Photinia serrulata* Lindl by CO₂ supercritical fluid extraction, Acad. Period. of Farm Prod. Process. **6**: 71-73.

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