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Studies on the Terpenoids in the Volatile Constituents of Liaoning Schisandra Chinensis Baillon

Dongyan Hou, Weihua Zhang and Ruihua Hui†

Department of Chemistry, Anshan Normal College, Anshan Liaoning, 114005, *P. R. China*

The Centre of Analysis and Measurement, Liaoning University, Shenyan Liaoning, 110036, *P. R. China*

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Abstract: The terpenoids in the volatile constituents of Liaoning Shcisandra Chinesis Baillon have been determined by the analytical method of GC/MS. Thirty terpenoids molecular structure were characterized. They are 11.89% monterpenes, 4.60% monoterpene oxides, 58.74% sesquiterpene hydrocarbons, and 1.62% oxygen-containing sesquiterpenoids in the total volatile constituents quantified by chromatograph. Among them, the sesquiterpene make up the characteristic constituents. Every terpenoid constituent percent content was obtained using area normalization method of HP—59970 chemstation.

Keywords: Schisandra Chinesis Baillon, Terpenoids, Sesquiterpenoids, Capillary GC/MS method identification.

1. Introduction

Schisandra Chinesis (Turcz.) Baillon is a tradition Chinese medicinal herb. It is used for treating hepatitis, neurashenia, emission and so on. A large number of reports on the schizan-

drin and organic acid have been published, but no study of the terpenoids in the volatile constituents have yet been made. In this paper, Schisandra Chinensis Baillon in Liaoning was extracted by ether, the volatile constituents were collected and determined over and over again, and thirty terpenoids were studied by capillary gas chromatograph-mass spectrometry. we found that sesquiterpene make up the characteristic constituents of the volatile oils in Liaoning Schisandra Chinesis Baillon. This charactristic component has an important value in practice and economy.

2. Experimental

Schisandra Chinensis Baillon from Liaoning province in China were smashed to 40 mesh, then the volatile oils were separated by steam distillation and solvent extraction. The content of the volatile oil in the Schisandra Chinensis Baillon was 2.50%.

Analysis was carried out with a model HP-5890 capillary column gas chromatography made by HEVETT PACKARD. Fused silica capillary column OV-101 was 25m×0.25mm×0.33μm. The column temperature was programmed from 60℃ to 180℃ at 2℃/min. The vaporizer temperature was 220℃. Hydrogen flam ionization detector was used, the rate of flow of helium carrier gas was 20mL/min.

Analysis with GC/MS was carried out using the modle HP-5988A GC/MS. The instrument was equipped with a computer for data processing and the spectrum data examination system was stocked by WILEY library.

The way of ionization: EI, ionization energy: 70ev, the projecting current: 300A. The mass range: 40-60 amu, the temperature of ion source: 220℃, the temperature of transfer line: 220℃.

3. Results and Discussion

Thirty terpenoids chemical constituents have been obtained by analyzing the Liaoning Schisandra Chinensis Baillon volatile oils. The analytical results are listed in Table 1.

Table 1 The Terpenoids Molecular Structure of the Schisandra Chinensis Baillon

NO.	Compound	Formula	M	Structure	Content	Index of standard spectra
1	β-Terpinene	$C_{10}H_{16}$	136		0.47	000099−84−3
2	α-Pinene	$C_{10}H_{16}$	136		0.78	000080−56−8

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NO.	Compound	Formula	M	Structure	Content	Index of standard spectra
3	β-Myrcene	$C_{10}H_{16}$	136	CH_2—CHCH$CH_3$$CH_2CH_2$CH═C$CH_3$$CH_3$	0.90	000123−35−3
4	β-Phellandrene	$C_{10}H_{16}$	136		5.84	000555−10−2
5	γ-Terpinene	$C_{10}H_{16}$	136		2.48	000099−85−4
6	δ-3-Carene	$C_{10}H_{16}$	136		0.42	013466−78−9
7	δ-4-Carene	$C_{10}H_{16}$	136		0.54	000554−61−0
8	Camphene	$C_{10}H_{16}$	136		0.46	000079−92−5
9	Myrtenol	$C_{10}H_{16}$	156		0.37	000078−70−6
10	Carveol	$C_{10}H_{16}O$	152		0.23	038049−26−2
11	α-Terpineol	$C_{10}H_{18}O$	154		0.35	000562−74−3
12	β-Citronellol	$C_{10}H_{20}O$	156		0.12	000106−22−9
13	Terpinene-4-ol	$C_{10}H_{18}O$	154		3.53	
14	α-Ylangene	$C_{15}H_{24}$	204		16.55	014912−44−8

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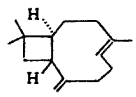
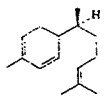
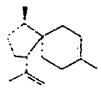
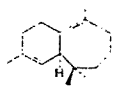
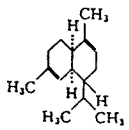
NO.	Compound	Formula	M	Structure	Content	Index of standard spectra
15	(E)-β-Farnesene	$C_{15}H_{24}$	204		0.40	000502−60−3
16	trans-Caryophyllene	$C_{15}H_{24}$	204		0.25	000087−44−5
17	(3Z, 6E)-α-Farnesene	$C_{15}H_{24}$	204		0.19	026560−14−5
18	β-Bisabolene	$C_{15}H_{24}$	204		3.34	000495−61−4
19	Zingiberene	$C_{15}H_{24}$	204		17.20	000495−60−3
20	β-Acoradiene	$C_{15}H_{24}$	204		2.82	0090457−37−7
21	β-Himachalene	$C_{15}H_{24}$	204		6.96	001461−03−6
22	(3Z, 6E)-β-Farnesene	$C_{15}H_{24}$	204		1.69	004608−84−0
23	α-Muurolene	$C_{15}H_{24}$	204		0.57	031983−22−9
24	(Z)−β−Farnesene	$C_{15}H_{24}$	204		2.78	028973−97−9
25	α-Longipinene	$C_{15}H_{24}$	204		0.68	005989−08−2
26	α-Humulene	$C_{15}H_{24}$	204		3.27	006753−98−6

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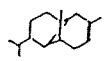
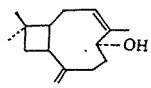
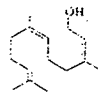
NO.	Compound	Formula	M	Structure	Content	Index of standard spectra
27	α-Copaene	$C_{15}H_{24}$	204		1.53	003856—25—5
28	α-Cubebene	$C_{15}H_{24}$	204		0.31	017699—14—8
29	Caryophyllene alcohol	$C_{15}H_{24}O$	220		1.30	032214—89—4
30	Farnesol	$C_{15}H_{26}O$	222		0.32	003790—71—4

The terpenoids in table 1 were identified according to WILEY library search, contrasting with EPA/NIH standard spectrogram and spice mass spectrograms reference, elucidalling the spectrogram from the prineiple of mass. The data of quanitative analysis were analysed by HP —5970 data processing system, the contents of the terpenoids were determined.

The weight of identified terpenoids is 76.85% of the volatile constituents.

Analytical results show that there are thirty terpenoids, i. e. eight monoterpenes, five monoterpene oxides, fifteen sesquiterpene hydrocarbons and two oxygen-containing sesquiterpenoids in the volatile constituents of the Schisandra Chinensis Baillon. Among them, the sesquiterpene amount to 58.74% of the total volatile constituents quantified by chromatograph. The sesquiterpene make up the characteristic constituents.

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