CHEMICAL COMPOSITION OF THE ESSENTIAL OILS OF FLOWERS OF *Rosa banksiae* FROM CHINA

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Rosa banksiae is a climber, growing to about 20 feet tall, and is very long lived. The flowers of *Rosa banksiae* have a lovely fragrance, similar to violets. It has no serious disease or insect problems. *Rosa banksiae* is an important and widespread woody plant in southwest China. It is reported that the flowers and leaves of this plant show free radical scavenging activity [1, 2]. Doctors of traditional Chinese medicine believe that the radical and leaves of this plant can stop pain and bleeding. However, it is noteworthy that the flowers of *Rosa banksiae* Ait.f. have a distinctive aroma. So far, there is no published scientific information in the literature on the chemical constituents of the volatiles of flowers of *Rosa banksiae* Ait.f. The objective of the present study is to provide qualitative and quantitative information on the volatiles present in flowers of *Rosa banksiae* Ait.f. from China.

The flowers of *Rosa banksiae* Ait.f. were collected during flowering (April, 2006) in Enshi, Hubei Province, China, as identified by Prof. Kaigong Lu (School of Biological Science & Technology, Hubei Institute for Nationalities), and placed in the shade to dry. Two hundred grams of dried flowers was placed in a three-neck flask. Distilled water (1500 mL) was added and the contents distilled for 5h in an oil bath. The distillate was extracted with anhydrous ether (AR grade). The extracted solution was combined, dried over anhydrous sodium sulfate (AR grade) overnight, and concentrated by passing a slow stream of oxygen-free nitrogen gas (99.99%) to it without ether. A bright reddish-yellow essential oil (0.2612 g) was obtained and stored at 4°C until analysis. The yield was 0.13%.

In total, 46 compounds were identified in flowers of *Rosa banksiae* Ait.f. from China (Table 1). These identified components constitute 94.15% of all identified peak areas using GC-FID with a DB-5 column. Of the total number of components identified, there are one acetal, 12 fatty hydrocarbons, three aromatic aldehydes, three carboxylic acids, five alcohols, two arenes, 17 terpenoids, and three phenols. As the main compounds (concentration higher than 1.0%), the following were found: octane (4.73%), phenylethyl alcohol (5.78%), 2-bornanone (26.34%), *cis*-verbenol (2.68%), borneol (3.78%), dodecane (41.01%), 6-methyldodecane (1.00%), elemicin (3.01%), and α-cadinol (1.06%). Among all the detected compounds in the flowers, we focus on the 17 terpenoids, which are responsible for the flowery odor.

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TABLE 1. Chemical Composition of the Essential Oils from Flowers of *Rosa banksiae* Ait.f.

Compounds	LRI/ref.LRI	Identification	Area, %	Compounds	LRI/ref.LRI	Identification	Area, %
Acetal	719/719	LRI, MS	Tr.	*p*-Menth-1-en-8-ol	1186/-	MS	0.20
Octane	798/800	LRI, MS, Co-GC	4.73	Dodecane	1199/1200	LRI, MS, Co-GC	41.01
Furfural	828/828	LRI, MS, Co-GC	Tr.	6-Methyldodecane	1251/1253	LRI, MS	1.00
Isovaleric acid	833/838	LRI, MS, Co-GC	Tr.	4-Methyldodecane	1257/1259	LRI, MS	0.36
2-Furan methanol	844/845	LRI, MS, Co-GC	Tr.	2-Methyldodecane	1261/1263	LRI, MS	0.24
Ethylbenzene	849/849	LRI, MS, Co-GC	Tr.	Perilla aldehyde	1277/1277	LRI, MS	0.50
p-Xylene	857/860	LRI, MS, Co-GC	Tr.	Tridecane	1295/1300	LRI, MS, Co-GC	0.81
Pentanoic acid	875/875	LRI, MS, Co-GC	Tr.	Perilla alcohol	1298/1295	LRI, MS	0.49
1-Nonene	881/888.8	LRI, MS	Tr.	Eugenol	1354/1355	LRI, MS	0.46
Benzaldehyde	955/957	LRI, MS, Co-GC	Tr.	Eugenol methyl ether	1395/1399	LRI, MS	0.44
1-Octen-3-ol	976/978	LRI, MS	Tr.	Elemicin	1555/1554	LRI, MS	3.01
Decane	992/1000	LRI, MS, Co-GC	Tr.	Spathulenol	1589/1578	LRI, MS	0.36
Eucalyptol	1026/1026	LRI, MS	Tr.	Caryophyllene oxide	1597/1594	LRI, MS	Tr.
Benzyl alcohol	1028/1030	LRI, MS, Co-GC	Tr.	Viridiflorol	1606/1604	LRI, MS	Tr.
Benzene acetaldehyde	1038/1037	LRI, MS	Tr.	Widdrol	1616/1606	LRI, MS	Tr.
3,3,6-Trimethyl-1,5-hepta-dien-4-ol	1079/1083	LRI, MS	Tr.	*tau*-Muurolol	1647/1643	LRI, MS	Tr.
				δ-Cadinol	1651/1649	LRI, MS	Tr.
Linalool oxide	1082/1082	LRI, MS	Tr.	α-Cadinol	1659/1654	LRI, MS	1.06
Undecane	1092/1100	LRI, MS, Co-GC	Tr.	Juniper camphor	1662/1675	LRI, MS	Tr.
Phenylethyl alcohol	1106/1104	LRI, MS	5.78	Nonadecane	1890/1900	LRI, MS, Co-GC	Tr.
2-Bornanone	1141/1144	LRI, MS	26.34	*n*-Hexadecanoic acid	1955/1957	LRI, MS	Tr.
cis-Verbenol	1158/1131	LRI, MS	2.68	Eicosane	1995/2000	LRI, MS, Co-GC	Tr.
Borneol	1162/1173	LRI, MS	3.78	Heneicosane	2089/2100	LRI, MS, Co-GC	Tr.
4-Terpineol	1173/1174	LRI, MS	0.90				

Tr.: trace amount; LRI: linear retention indices; Co-GC: identification by retention time identical to authentic compounds.

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