

EXTRACTION OF ESSENTIAL OIL FROM *ROSA POLYANTHA* AND ITS GC-MS STUDY

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ABSTRACT

Rose essential oils are primarily used in the perfume industry and have a very high commercial value due to its curative properties. These are composed of heat-sensitive chemical compounds, the use of conventional steam distillation technique would inevitably cause thermal degradation to the fragrance. In this experimental work, solvent extraction method was employed due to its mild extracting condition and lower operating cost. Solvent n-Hexane was used for extracting essential oil from rose. The extract compositions were analyzed using gas chromatographic technique. Preliminary results showed that volatile oil compounds were successfully isolated from rose flowers using the solvent. Various parameters such as solubility, odour, taste, density and boiling point of extracted essential oil were also checked.

Keywords: *Rosa polyantha*, n-Hexane, solvent extraction, GC-MS.

INTRODUCTION

Essential oils are also known as volatile oil extracted from plant. An oil is “essential” in the sense that it contains the “essence” of the plant’s fragrance the characteristics fragrance of the plant from which it is derived [1]. The term essential used here does not mean indispensable as with the terms of essential amino acid or essential fatty acid which are so called since they are nutritionally required by a given living organism [2]. It can also be used for medicinal purposes throughout history. From the vast number of species of plant that are known, about 3000 essential oils have been well identified, though only some 150 have been exploited for commercial production. The most odoriferous plants are found in the tropics, where the solar energy (energy that generates from sun) is greatest. A plant produces its essential oil in the protoplasm of its cells. The oil is an excretion, which does not participate in the metabolism of the plant. The oils are rich in energy and chemically very active; therefore, it is somewhat surprising for the plant to expel such an amount of energy without making use of it. The oils are stored in the form of micro droplets in the glands of the plants. After diffusing slowly through the wall of the gland, these droplets spread out on the surface of the plant before evaporating and filling the air with perfume.

Among the natural compounds, essential oils are used as constituents of fragrances, food flavours and raw materials for the pharmaceutical industry [3]. Volatile oils have been shown to possess antibacterial, antifungal, antiviral,

insecticidal and antioxidant properties [4, 5]. Essential oils are commonly found in dietary and other plants, and they exhibit numerous biological effects: antioxidant [6, 7], anti-inflammatory and anti-carcinogenic [8]. These compounds are further divided into subclasses according to their chemical structure [9, 10].

Essential oils are used for many different reasons and in different ways. They have a profound effect on the central nervous system, relieving depression and anxiety, reducing stress, and relaxing. Many essential oils are used in perfumery. It takes many pounds of flowers to construct ounce of essential oil. Moreover essential oil is utilized as aromatherapy which is a form medicine. Many essential oil often diluted and sometimes the oil is adulterated with synthetic chemicals.

Rose(*Rosa polyantha*) has a beautiful, strong floral and sweet fragrance that is intoxicating and highly romantic. It helps bring balance and harmony with stimulating and uplifting properties that create a sense of well-being and self-confidence. Used for skin care for thousands of years, it is perfect for dry or ageing skin. Rose as an approximate of ORAC of 1,604,284(TE/L). TE/L is expressed as micromole Trolox equivalent per litre. The flower is grown for their flowers in the garden and sometime indoors. It is also used for commercially cut flower crops. They have minor medicinal uses. Perfumeries say that it takes about seven million jasmine flowers to produce one kilogram of pure oil, valued at approximately RM13, 260. Each flower must be handpicked early in the morning when jasmines possess the highest oil content.

Some plant like rose and jasmine contain very little essential oil. Their important aromatic properties are extracted using a chemical solvent. The end product, known as an absolute, contains essential oil along with other plant constituents. Though not a true essential oils, absolute are commonly used for fragrance cosmetic product like fine perfumes.

MATERIALS AND METHODS

Sample Collection

The rose flower petals collected from the local market at Tambaram, Chennai, Tamil Nadu, India and were identified.

Extraction of oil by solvent extraction method

A hydrocarbon solvent such as n-Hexane was kept in a flask which was evaporated and the vapour was allowed to pass through the rose petal bulb which was kept above the solvent. The extraction setup is shown in Fig.1. Extraction process was continued till the oil gets concentrated. Fresh, botanical material is placed in the plant chamber of the still and the solvent vapor was allowed to pass through the herb material under pressure which softens the cells and allows the essential oil to escape in vapor form. As the time increases the vapor production increases which extract the oil from the petals at the boiling point of the water. After 4-5 hours of operation the extraction of oil ceases.



Fig.1 Extraction of oil

Analysis of the physical properties essential oil

Various properties such as colour, odour, taste, density, solubility, boiling point are measured as per the standard procedure.

GC-MS Analysis

GC-MS study of extracted rose oil was checked by Agilent Technologies, Chennai.

RESULTS AND DISCUSSION

The amount of essential oils obtained contains more than 2 ml of essential oil per 150 gms of oven dried rose leaves, where as essential oil obtained from the Bay leaves contains very small amount of oil in comparison to the oil obtained from Rose. The essential oil forms a film on the

The extracted oil has boiling point of 229°C and density 0.921. Colour of the oil was found to be pale yellow and was insoluble in water (Table.1).

In the rose essential oil extracted through solvent (n-Hexane), 19 components were identified. The components identified through gas chromatography in rose essential oil are phenylethyl alcohol(66.3 per cent), Ethanol,2-(9,12-octadecadienyloxy)-(Z,Z) (10.02 per cent), ethyl iso-allocholate (3.04 percent) , ethanol ,2-(9,12-octadecadienyloxy)-(Z,Z) (4.8 percent) , E-11-methyl-12-tetrahydron-1-ol acetate (18.67 percent) , ethanol,2-(9,12-octadecadienyloxy)-(Z,Z) (6.23

Percent),ethanaol,2-(9,12-octadecadienyloxy)-(Z,Z) (74%) (Fig.1,2) (Table.2). GC-MS report showed that 9, 12-octadecadienoic acid was found to be more in the oil.

Table.1 Physical Properties of rose oil

S. No.	Property	Details
1	Colour	Pale yellow liquid
2	State	Liquid oil
3	Odour	Sweet rose
4	Taste	Bitter
5	Boiling point	229 ⁰ C
6	Density of oil	0.921 to 0.923
7	Solubility in water	Insoluble

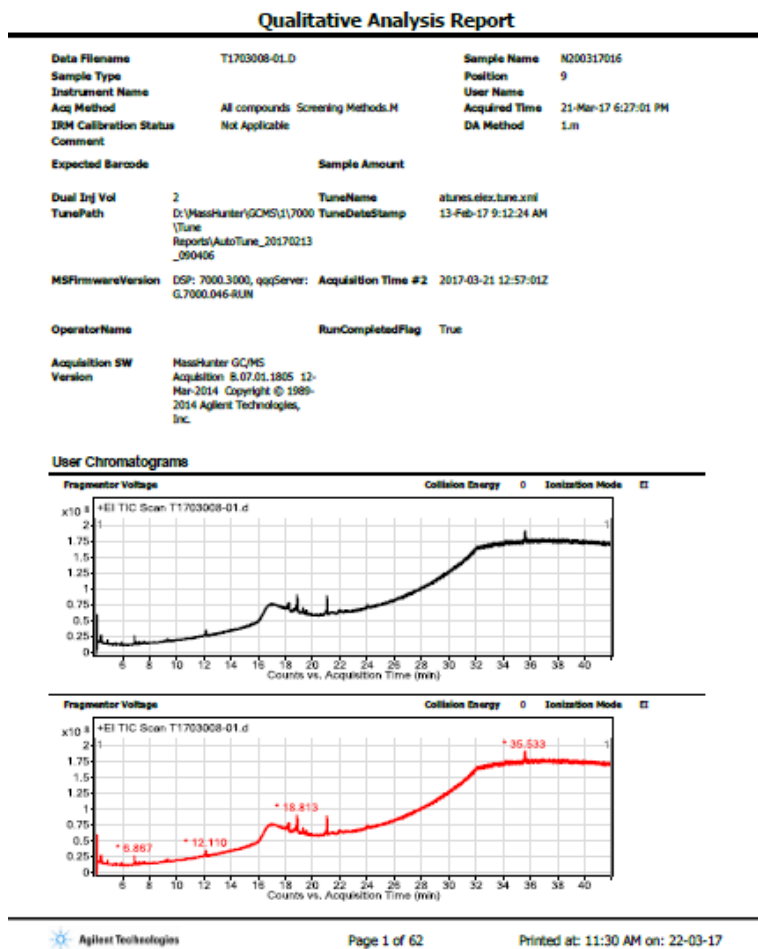
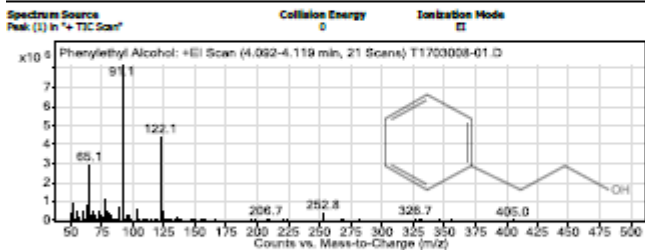


Fig. 2 GC-MS Report

Qualitative Analysis Report

Peak	Start	RT	End	Height	Area	Area %	Area/umPercent
1	4.077	4.115	4.119	6088220	72041510	66.3	13.83
2	4.372	4.412	4.42	10922877	10887916	10.02	2.09
3	4.427	4.442	4.48	10967873	14168805	13.04	2.72
4	4.878	4.911	4.931	5105687	5294357	4.87	1.02
5	6.825	6.867	6.899	12941854	20286600	18.67	3.89
6	6.922	6.955	6.978	4521055	6766438	6.23	1.3
7	6.997	7.032	7.056	2875767	4609111	4.24	0.88
8	7.35	7.223	7.247	3592741	5330575	4.91	1.02
9	7.392	7.429	7.469	2698805	3842183	3.54	0.74
10	7.5	7.591	7.611	3211821	10534068	9.69	2.02
11	9.175	9.216	9.24	2459401	3813086	3.51	0.73
12	9.266	9.308	9.336	2715369	4526115	4.17	0.87
13	12.051	12.11	12.152	8100143	19907470	18.32	3.82
14	18.151	18.224	18.265	12017242	38941603	35.84	7.48
15	18.718	18.813	18.856	22782502	81405412	74.92	15.63
16	19.138	19.253	19.298	8532244	26126105	24.04	5.02
17	19.418	19.492	19.536	5142660	13994264	12.88	2.69
18	20.803	20.999	21.122	28890127	108663297	100	20.86
19	35.476	35.533	35.637	15991493	69792160	64.23	13.4

User Spectra



Library Spectrum

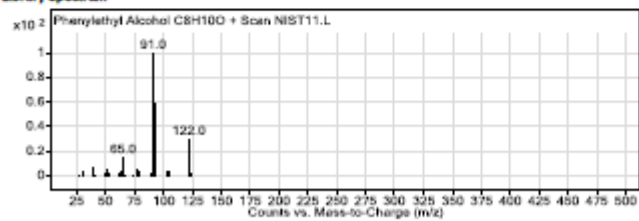


Fig. 3 GC-MS Report

Table.2 GC-MS Analysis Report

Peak	Name of the compound	Retention time	Area %
1	Phenylethyl alcohol	4.115	66.3
2	Ethanol,2-(9,12-octadecadienyloxy)-(Z-Z)	4.412	10.02
3	Ethyl iso-allocholate	4.442	13.04
4	Ethanol,2-(9,12-octadecadienyloxy)-(Z-Z)	4.911	4.87
5	E-11-methyl-12-tetrahedron-1-ol acetate	6.867	18.67
6	Ethanol,2-(9,12-octadecadienyloxy)-(Z-Z)	6.955	6.23
7	Ethanol,2-(9,12-octadecadienyloxy)-(Z-Z)	7.032	4.24
8	Ethanol,2-(9,12-octadecadienyloxy)-(Z-Z)	7.223	4.91
9	Ethanol,2-(9,12-octadecadienyloxy)-(Z-Z)	7.429	3.54
10	Ethanol,2-(9,12-octadecadienyloxy)-(Z-Z)	7.591	9.69
11	9,12-octadecadienoic acid-(Z-Z)	9.216	3.51
12	9,12-octadecadienoic acid-(Z-Z)	9.308	4.17
13	9,12-octadecadienoic acid-(Z-Z)	12.11	18.32
14	9,12-octadecadienoic acid-(Z-Z)	18.224	35.84
15	9,12-octadecadienoic acid-(Z-Z)	18.813	74.92
16	9,12-octadecadienoic acid-(Z-Z)	19.253	24.04
17	9,12-octadecadienoic acid-(Z-Z)	19.492	12.88
18	9,12-octadecadienoic acid-(Z-Z)	20.999	100
19	1-monolinoleoylglycerol trimethylsilyl ether	35.533	64.23

CONCLUSION

The world production and consumption of essential oils and perfumes are increasing very fast. Production technology is an essential element to improve the overall yield and quality of essential oil. The traditional technologies used for extracting essential oil are of great significance and are still being used in many parts of the world. Water distillation, water and steam distillation are generally used for extracting essential oil from *Rosa polyantha*. In this study, solvent extraction method was used for extracting oil from *Rosa polyantha* and the compounds were identified by GC-MS.

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