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GC-MS ANALYSIS OF LEAF EXTRACTS OF *PTEROSPERMUM CANESCENS* Roxb. (Sterculiaceae)

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ABSTRACT

Pterospermum canescens Roxb., is one of the medicinally important plant belonging to the family Sterculiaceae, is commonly known as "Sembolavu" in Tamil. Traditionally the plant is used for the treatment of headache, bronchitis, throat infections, skin diseases, leprosy, inflammation and sores. The present study was planned to identity the number of constituents present in *Pterospermum canescens* Roxb., leaf by quantitative GC-Ms analysis. The analysis was carried out for the petroleum ether, chloroform and methanol leaf extracts of *Pterospermum canescens* Roxb., and the results were exhibited the presence of 15, 6 and 20 compounds in the above respective extracts. The major chemical constituents are squalene, phytol, α-sitosterol, vitamin-E and tocopherol.

Key words: *Pterosperumum canescens,* Sterculiaceae, GC-MS, Phytol, Squalene.

INTRODUCTION

For thousands of years, plant products and their modified derivatives have been rich source for clinically useful drugs. Even today, about 80% of the world's population relies predominantly on plants and plant extracts for health care[1]. Natural products as a pure compound or as a standardized plant extracts provide unlimited opportunities for new drug lead because of unmatched availability of chemical diversity. Therefore, there is a need to develop an efficient, safe and inexpensive drugs from plant source are of great importance[2].

The genus *Pterospermum* Schreb. (Sterculiaceae) represents of about 40 species in the world, of which 12 species were reported from India and 8 species from Tamil Nadu state[3]. An ethno medicinal plant species *Pterospermum canescens* Roxb. (Syn:

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Pterospermum suberifolium Lam.) is locally known as "Sembolavu" was distributed in all districts of Tamil Nadu. Ethno medicinally, the leaves are used for headache[4] and Valiyan tribals from Dindigal district, applied leaf paste mixed with the stem bark of *Drypetes roxburghii* (Wall.) Hurus (Putranjivaceae, "Pilla maram"), a few leaves of *Blepharis maderaspatensis* (L.) B.Heyne (Acanthaceae, "Elumbu otti") and the yellow yolks of 2 eggs on fractured bones[5]. Flowers and bark are charred, mixed with kamala and applied in suppurating small pox[6]. A pharmacological activity such as anti cancer activity, cytotoxicity has also been reported[7,8]. Hence, the objective of the present study is to identify the phytochemical constituents of *Pterospermum canescans* Roxb., with the aid of GC-MS technique.

EXPERIMENTAL

Materials and methods

Plant material

The leaves of *Pterospermum canescens* Roxb., were collected in the month of May from the Kalapet vicinity of Pondicherry and the collected plant material was botanically identified and confirmed by the plant Taxonomist Mr. A. C. Tangavelou and Dr. Susai, St. Joseph's College (Autunomous), Tiruchirappalli, Tamil Nadu. A voucher specimen (KPJ 42) was prepared and deposited at the department for future reference.

Preparation of extracts

The collected leaves were subjected to shade drying and pulverized to coarse powder in a mechanical grinder. The coarse leaf powder was successively extracted with various solvents such as petroleum ether (40^o – 60^oC), chloroform and methanol by using continuous hot percolation method with the help of Soxhlet apparatus[9,10]. The extracts were collected and distilled off on a water bath at atmospheric pressure and the last trace of the solvent was removed *in vacuo*. The resulted extracts were used for GC-MS analysis.

GC-MS analysis of plant extracts[11]

The GC-MS analysis was carried out on a GC Clarus 500 Perkin Elmer system, comprising an Aoc-20i Auto sampler and Gas chromatograph interfaced to a mass spectrometer instrument, employing the conditions: Column Elite -5Ms fused silica capillary column (30 x 0.25 mm, 1D x 1mm df, composed of 95% Dimethyl Poly diloxane, 5% Diphenyl Polysixone), operating in electron impact mode at 70 ev; helium (99.999%) was used as carrier gas at a constant flow of 1 mL/min and an injection volume of 2 mL was employed (split ratio of 10 : 1), injector temperature is 200^oC; ion-source temperature is

200°C. The oven temperature was programmed from 110°C (isothermal for 2 min), with an increase of 10°C /min, to 200°C, then 5°C /min to 280°C ending with a 9 min isothermal at 280°C. Mass spectra were taken at 70 ev; a scan interval of 0.5 seconds and fragments from 40 to 450 Da. Total GC running time is 36 min.

Identification of compounds

GC-MS chromatogram of petroleum ether, chloroform and methanol leaf extracts of *Pterospermum canescens* Roxb., (Fig. 1-3), showed 15, 6 and 20 peaks indicating the presence of respective number of compounds. Interpretation of mass spectrum was conducted by using the database of National Institute of Standard and Technology (NIST) having more than 62,000 patterns. The name, molecular weight and structure of the components of test materials were characterized and identified (Table 1-3). Mass spectrum of some important compounds present in this plant was depicted (Fig. 4-13).

RESULTS AND DISCUSSION

GC-MS Chromatogram of petroleum ether leaf extract of *Pterospermum canescens* Roxb., (Fig. 1) showed 15 peaks represent the phyto constituents were α-sito sterol (19.38%), 3, 7, 11, 15-tetramethyl-2-hexa decane-1-ol (18-56%), ricinoleic acid (10.56%), vitamin-E (10.49%), phytol (9.71%), α-tocopherol (6.29%), diethyl phthalate (5.09%), squalene (5.07%), benzhydrazide-3-mthoxy-N2-(4-phenylcyclo hexylideno (4.62%), benzoic acid,4-heptyl-4-cyanophenyl ester (4.41%) and n-hexa decanoic acid (4.08%).

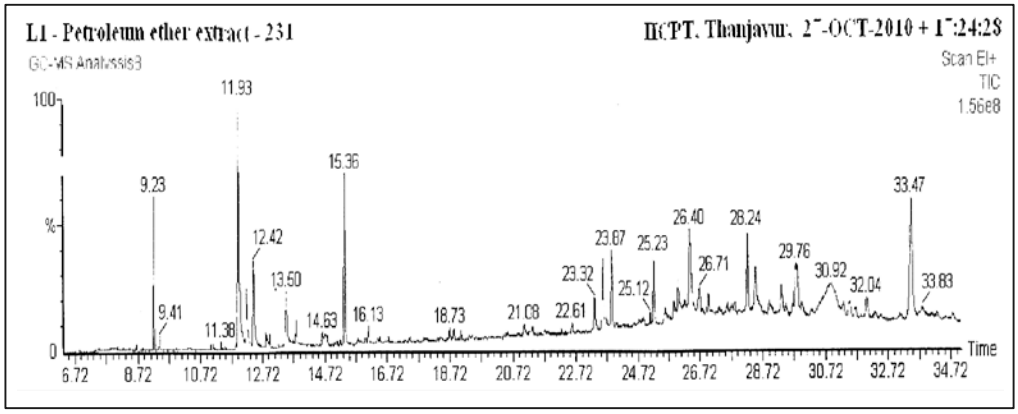

Fig. 1: Chromatogram of petroleum ether leaf extract

GC-Ms chromatogram of chloroform leaf extract of *Pterospermum canescens* Roxb., (Fig. 2) showed 6 peaks, represent the phyto constituents, were (3,7,7-trimethyl-1-penta-1,3-

dienyl-2-oxabicyclo [3.2.0] hept-3-ene (49.04%), 2-allyl-4-methylphenol (30.49%) and asarone (9.43%).

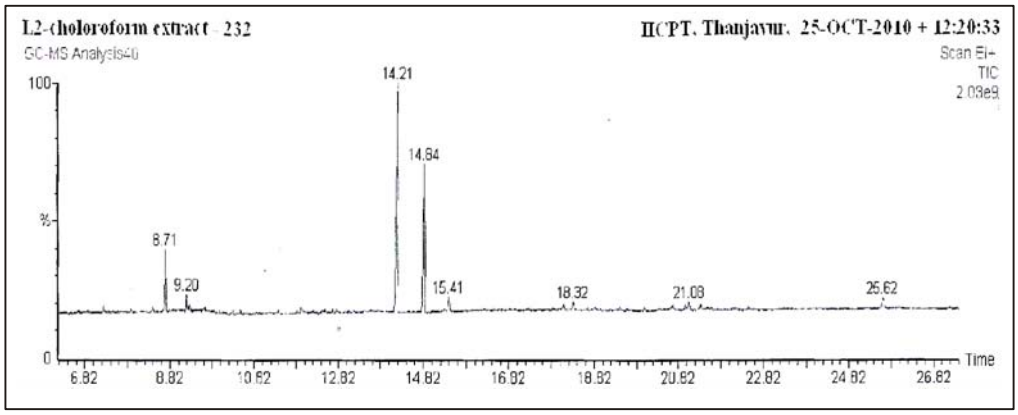

Fig. 2: Chromatogram of chloroform leaf extract

GC-MS chromatogram of methanol leaf extract of *Pterospermum canescens* Roxb., (Fig. 3) shows 20 peaks, represent the phytoconstituents were diethyl phthalate (53.84%), ricinoleic acid (20.74%), glyceryl monoricinoleate (10.25%), methyl ricinoleate (3.93%), 4-((1E)-3-hydroxy-1-propenyl)-2-methoxyphenol (2.33%) and 7-methyl-Z-tetradecen-1-ol acetate (2.10%).

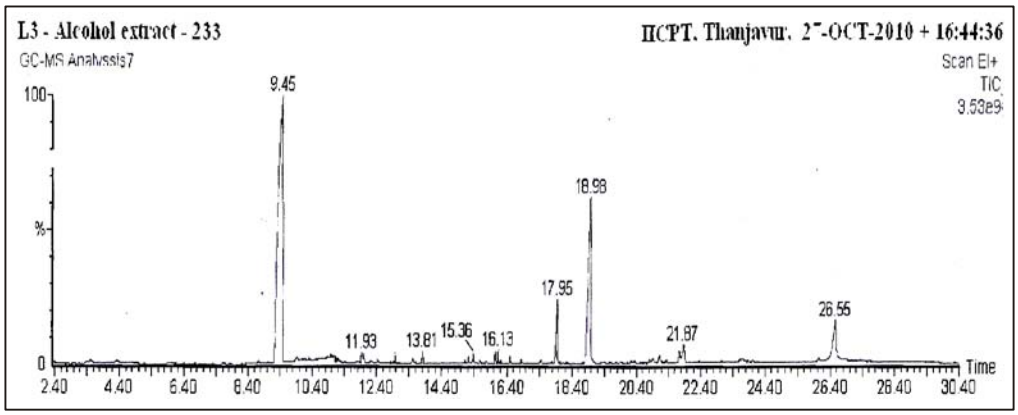

Fig. 3: Chromatogram of methanol leaf extract

It is worthwhile, to indicate that there are no data in the literature of investigated the phytochemical constituents of *Pterospermum canescens* Roxb., leaves for comparison. Due to the limitation of present study, we could not evaluate the biological properties of *Pterospermum canescens* Roxb., are suggested for future research.

Table 1: Components identified in the petroleum ether leaf extract of *Pterospermum canescens* Roxb.

S. No.	RT	Name of the compound	Molecular formula	MW	Peak area%
1	8.67	2(4H)-Benzofuranone,5,6,7,7α-tetrahydro-4,4,7α-trimethyl-	$C_{11}H_{16}O_2$	180	0.21
2	9.23	Diethyl Phthalate	$C_{12}H_{14}O_4$	222	5.09
3	9.41	Dihydrojasmone	$C_{11}H_{18}O$	166	0.42
4	11.38	3,3-Dimethyl-hepta-4,5-dien-2-ol	$C_9H_{16}O$	140	0.28
5	11.93	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	$C_{20}H_{40}O$	296	18.56
6	13.50	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	4.08
7	15.36	Phytol	$C_{20}H_{40}O$	296	9.71
8	16.13	9-Octadecenal	$C_{18}H_{34}O$	266	0.84
9	23.58	Benzoicacid,4-heptyl-4-cyanophenyl ester	$C_{21}H_{23}NO_2$	321	4.41
10	23.87	Benzhydrazide,3-methoxy-N2-(4-Phenylcyclohexylideno)-	$C_{20}H_{22}N_2O_2$	322	4.62
11	25.23	Squalene	$C_{30}H_{50}$	410	5.07
12	26.40	Ricinoleic acid	$C_{18}H_{34}O_3$	298	10.56
13	28.24	ç-Tocopherol	$C_{28}H_{48}O_2$	416	6.29
14	29.76	Vitamin-E	$C_{29}H_{50}O_2$	430	10.49
15	33.47	á-Sitosterol	$C_{29}H_{50}O$	414	19.38

Table 2: Components identified in the chloroform leaf extract of *Pterospermum canescens* Roxb.

S. No.	RT	Name of the compound	Molecular formula	MW	Peak area %
1	8.71	Asarone	$C_{12}H_{16}O_3$	208	9.43
2	9.20	1H-Cycloprop[e] azulen-7-ol,decahydro-1,1,7-trimethyl-4-methylene-, [1ar-(1aά, 4 aά, 7 ά, 7 aά, 7 bά)]- (Syn: Sputhulenol)	$C_{15}H_{24}O$	220	3.13

Cont…

S. No.	RT	Name of the compound	Molecular formula	MW	Peak area %
3	14.21	3,7,7-Trimethyl-1-penta-1-3-dienyl-2-oxbicyclo[3.2.0]hept-3-ene	$C_{14}H_{20}O$	204	49.03
4	14.84	2-Allyl-4-methylphenol	$C_{10}H_{12}O$	148	30.49
5	15.41	Phytol	$C_{20}H_{40}O$	296	3.31
6	25.62	Squalene	$C_{30}H_{50}$	410	4.60

Table 3: Components identified in the methanol leaf extract of *Pterospermum canescens* Roxb.

S. No.	RT	Name of the compound	Molecular formula	MW	Peak area%
1	3.52	1-Butanol, 3-methyl- formate	$C_6H_{12}O_2$	116	0.99
2	4.32	1-Methyl-pyrrolidine-2-carboxylic acid	$C_6H_{11}NO_2$	129	1.02
3	5.99	Phthalic anhydride	$C_8H_4O_3$	148	0.17
4	9.45	Diethyl Phthalate	$C_{12}H_{14}O_4$	222	53.84
5	9.94	Ethyl á-d-glucopyranoside	$C_8H_{16}O_6$	208	0.69
6	10.98	4-[(1E)-3-Hydroxy-1-propenyl]-2-methoxyphenol	$C_{10}H_{12}O_3$	180	2.33
7	11.93	Oxirane, tetradecyl-	$C_{16}H_{32}O$	240	0.54
8	12.97	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270	0.32
9	13.52	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	0.35
10	13.81	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	0.45
11	15.13	9,12-Octadecadienoic acid, methyl ester, (E,E)-	$C_{19}H_{34}O_2$	294	0.13
12	15.22	9,12,15-Octadecadienoic acid, methyl ester, (Z,Z,Z,)-	$C_{19}H_{32}O_2$	292	0.28
13	15.36	Phytol	$C_{20}H_{40}O$	296	0.51
14	16.04	Linoleic acid ethyl ester	$C_{20}H_{36}O_2$	308	0.49

Cont…

S. No.	RT	Name of the compound	Molecular formula	MW	Peak area%
15	16.13	Ethyl Oleate	$C_{20}H_{38}O_2$	310	0.54
16	16.49	Octadecanoic acid, ethyl ester	$C_{20}H_{40}O_2$	312	0.34
17	17.95	Methyl ricinoleate	$C_{19}H_{36}O_3$	312	3.93
18	18.98	Ricinoleic acid	$C_{18}H3_4O_3$	298	20.74
19	21.87	7-Methyl-z-tetradecen-1-ol acetate	$C_{17}H_{32}O_2$	268	2.10
20	26.55	Glyceryl monoricinoleate	$C_{21}H_{40}O_5$	372	10.25

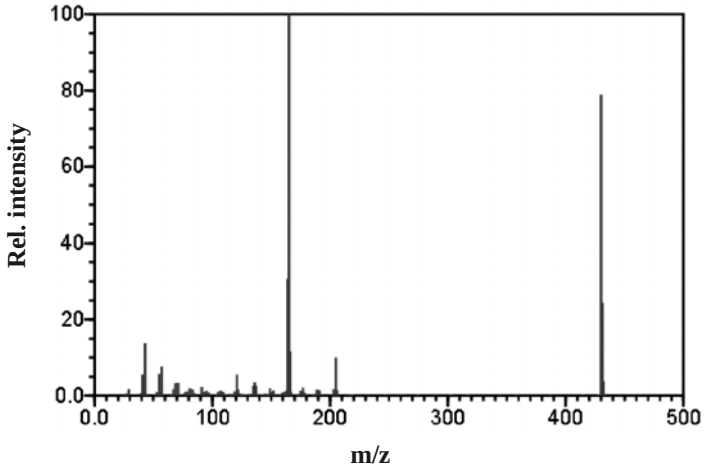

Fig. 4: Mass spectrum of Vitamin E

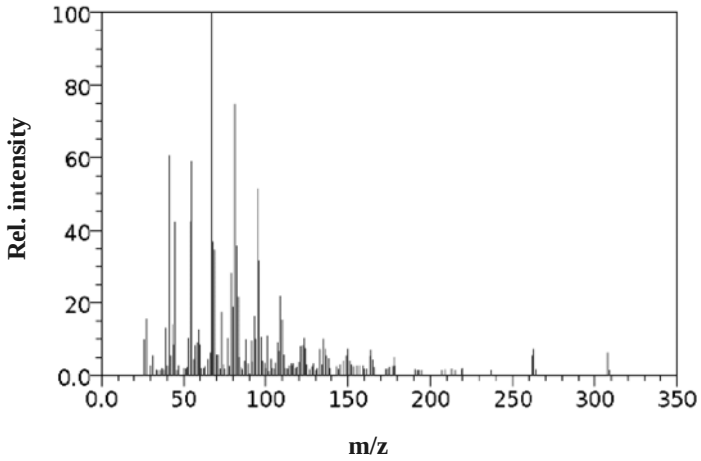

Fig. 5: Mass spectrum Linoleic acid ethyl ester

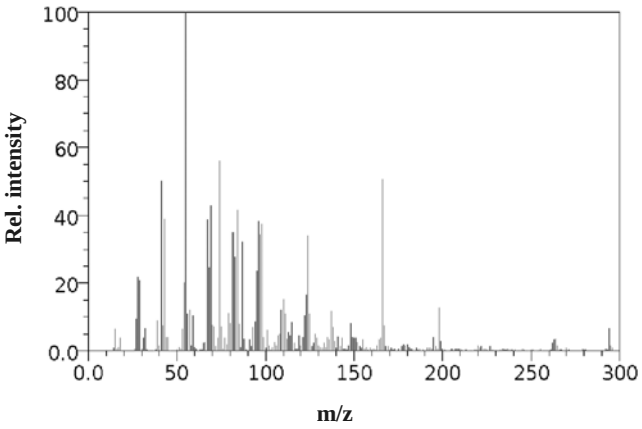

Fig. 6: Mass spectrum of 9-Octadecenoic acid, 12-hydroxy-, methyl ester, [R-(Z)]-

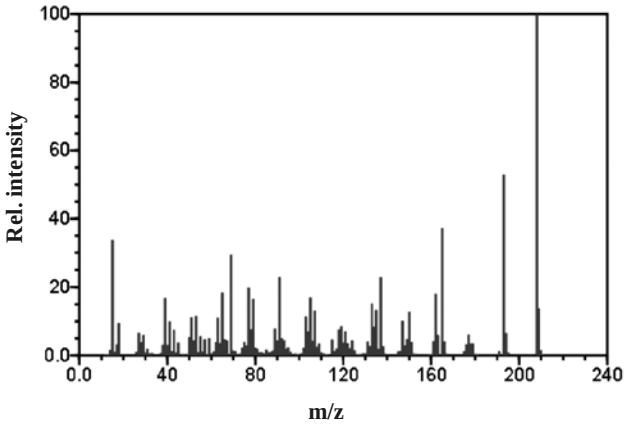

Fig. 7: Mass spectrum of asarone

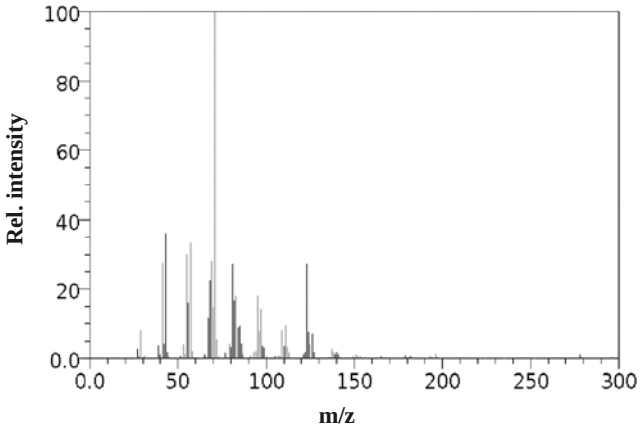

Fig. 8: Mass spectrum of Phytol

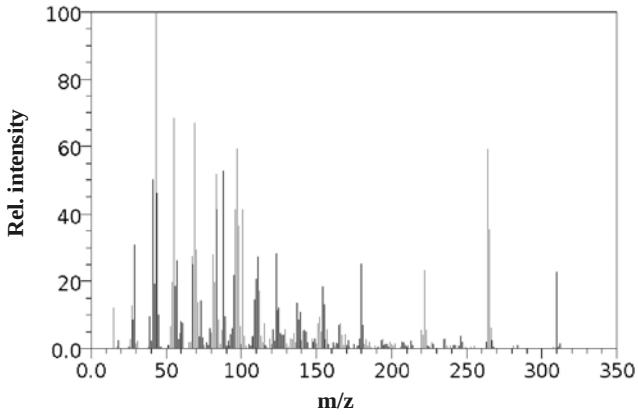

Fig. 9: Mass spectrum of ethyl oleate

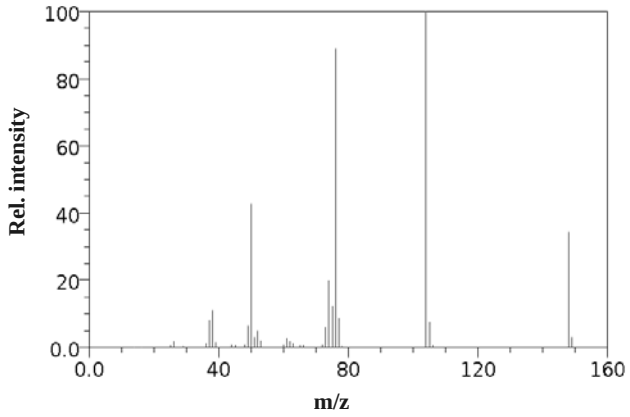

Fig. 10: Mass spectrum of phthalic anhydride

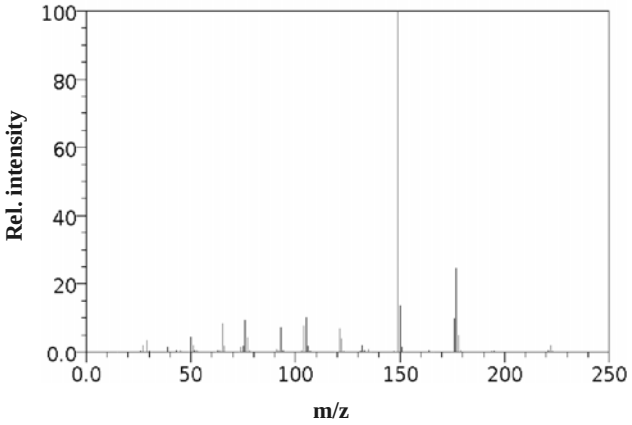

Fig. 11: Mass spectrum of diethyl phthalate

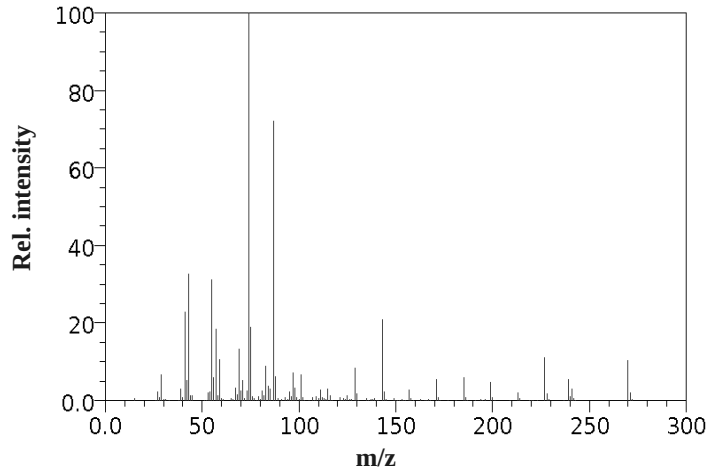

Fig. 12: Mass spectrum of hexadecanoic acid, methyl ester

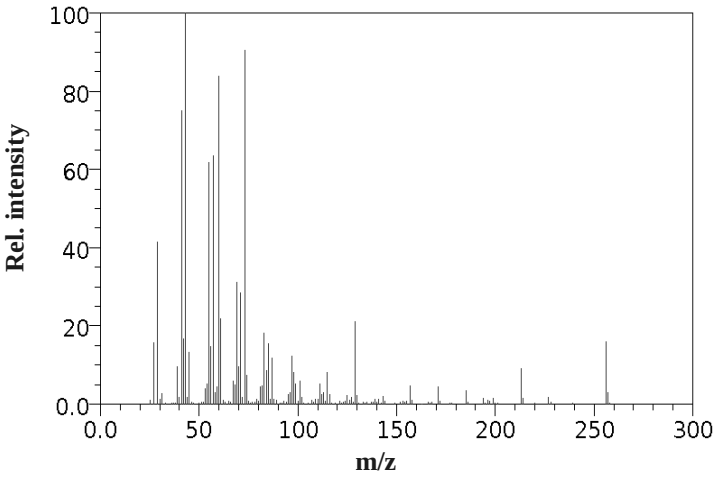

Fig. 13: Mass spectrum of n-hexadecanoic acid

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