

Research Article

**A STUDY ON PHYTOCONSTITUENTS, BIOACTIVITY, USES:
ANALYSIS OF ACETONITRILE LEAF EXTRACT OF
ABUTILONPANNOSUM WITH GAS CHROMATOGRAPHY
MASS SPECTROMETRIC TECHNIQUE**

Sejalsadhu¹, Vijay Ram¹, Mital Aadesariya¹, Pragnesh Dave¹ and *Ekta Khosla²

1Center of Excellence in Chemical Science & Technology and Department of Chemistry, KSKV Kachchh University, Mundra Road, Bhuj-370 001, Gujarat, India

2Department of Chemistry, Hans Raj Mahila Mahavidyalaya, Jalandhar (Punjab), India

**Author for Correspondence*

ABSTRACT

The purpose of this study is to examine extraction, isolation and identification of useful phytochemicals from Acetonitrile (ACN) leaf extract of *Abutilon Pannosum* leaves by using GCMS. The ACN extract of GCMS study shows the significant Phytoconstituents like triterpene, fatty acids, monoterpene, aromatic flavoring agent, esters, n-alkanes, saturated aliphatic hydrocarbon, diterpene, olefin, monoglyceride, monoterpenoid phenol, keton, poly unsaturated poly acid, Vitamin E were found to present in major and minor amount. As per literature review most of components show various bioactivities with useful applications in different fields. *Abutilon Pannosum* plant leaves is capable to play a major role in medicine formulation and helps to build the capacity to form a secondary metabolite like steroids, alkaloids, flavonoides, phenols etc. These identified phytochemicals can be useful to heal many diseases and improvement of health of human beings. Across India, many plants are available with significant medicinal values, among them *Abutilon Pannosum* leaves having number of very useful phytochemicals present in its leaves material. *Abutilon Pannosum* is one of the most important plants with high medicinal value, which is manifested in present study.

Keyword: GCMS, Phytoconstituents, Bioactivity, *Abutilon Pannosum*

INTRODUCTION

Abutilon is the one of the important genus. Its family contain of Malvacene cosmopolitan family with 88 genera that contain a 2,300 species that spread as tropical, temperate and subtropical regions. It is commonly known as “*Kanghi*”. This plant contains a various medicinal uses - induced in treatment of Dysentery, Gonorrhoea many diseases. Various part of this plant have been used. It contains various pharmacological and medicinal activities.

Seed: as a laxative in piles

Root, Bark: diuretic, anthelmintic, pulmonary, sedative, fever.

Bark: Astrigent, laxative

Extract: relieving thirst, in treating bronchitis, diarrhea, gonorrhoea and inflammation of the bladder reducing fever. This plant contains Gallic acid, tannins asparagines, mucilage, sesquiterpens, etc (Anup and Arbat, 2012). In this plant, many secondary metabolite synthesized compounds are present, that are biologically very active and contain such type of property, therefore, they have used in medicinal field (Survase *et al.*, 2013). The purpose of the present study is to get information about phytoconstituents by use of acetonitrile leaf extract of *Abutilon Pannosum* by GCMS.

MATERIALS AND METHODS

Preparation of Plant Material and Extraction

Plant material was collected from the Ashmbiya Road Mandavi- Kutch (Gujarat), India. Leaves were washed with tap water followed by distilled water and dried in shade. By use of electrical grinder get the fine powder of plant and ready to use for further study and prepare for (Acetonitrile) ACN extraction. The ACN extract lived for 2 hours.

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GCMS Analysis

The Gas chromatography-Mass spectrometry (GC-MS) analysis of ACN extract of *Abutilon Pannosum*. Instrument that is used for analysis was Shimadzu made GC-MS QP2010. The composition of the volatile constituents was established by GCMS analyses. GCMS analyses were performed on a Shimadzu GCMS-QP2010 system in EI mode equipped with a split/split less injector (300.00°C), at a split ratio of 1/10, using a SGE make BPX5WCOT (Wall coated open tubular) capillary column (30m,0.25mm i.d.,0.25µm film thickness). Helium was used as a carrier gas at a flow rate of 2.5ml/min. The injection volume of each sample was 3µl. Column Oven Temperature was maintained at 70.0°C to 300.0°C with a rate 25.00 and Hold Time (min) 2.00. Flow rate of Carrier gas was 1.47 mL/min. The chromatogram has been shown in Figure 1 and identified by Comparison with NIST and Willy compound library which is presented in Table 1.

Various analytic technique like that TLC, UV, NMR, including GCMS that were powerful tools for separation, detection, identification and structural determination of phytochemical containing bioactive components. We used Hyphenated Gas Chromatography Mass Spectrometric Technique. In this study, the relative percentage of the each of these extract constituents were expressed as percentage with peak area normalization.

Identification of Phytocomponents

The identification of bio component in ACN extract of *Abutilon Pannosum* was done by Mass Spectroscopy by view of the comparison of retention indices and mass spectra fragmentation patterns with stored in the computer library National Institute of Standards Technology (NIST08s) and Wiley Registry of Mass Spectral Data's, New York (Wiley 8) were used for matching the identified compound in used in the above extract.

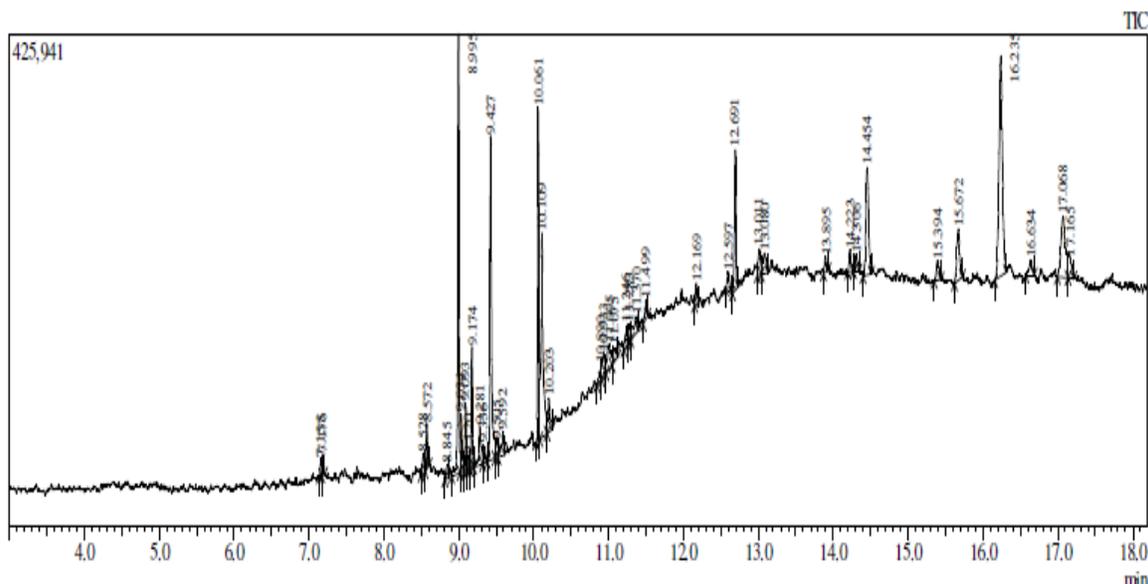
RESULTS AND DISCUSSION

The present research report is about the various important phytocomponent present in medicinal plant *Abutilon Pannosum*. The GCMS technique, results concluded that the phytoconstituents involved in many activities. The above chromatogram shows the particular peak with mass, that reveals characteristics of various components present is taken by use of CAN extract. The spectrum (Figure 2) revealed compounds in major and minor amounts.

The components illustrated various types of bioactivity as well as many applications in important industries in many fields. In present study, various components present in expensive plant extract of *Abutilon Pannosum*. Various type of compounds present like that triterpene, fatty acid, volatile compound, monoterpenes, aromatic acid, flavoring agent, esters, *n*- fatty aliphatic hydrocarbon, diterpene, olefin, monoglyceride, monoterpenoid phenol, keton, poly unsaturated poly acid, Vitamin E. Present study reports components in the spectrum like that beta-sitosterol widely used in cosmetics, anti-inflammatory effect on atopic skin (Duke's phytochemical database, 2016). It is helpful to decrease the cholesterol level and also apply in improving symptoms of benign prostatic hyperplasia. This is discovered that these compounds have modulating activity and antitumor activity in animal models (Ara Der et al., 2004). The clinical human trials and also used in pharmaceutical dl. alpha tocopherol also found in this spectrum which act as an antioxidant contain vitamin E which is an active ingredient because of its stability (Duke's phytochemical database, 2016) which contains acute toxicity DraLLD50 value>4000(rat and mus) (www.safetydata.com, 2016). Such type of triterpene like that 2, 6, 10, 14, 18, 22-Tetracosahexaene (one of squalene), which have various bioactivity as reported in Table 3. It contains an acute toxicity Rat-LD50 route oral dose- 400 mg/kg. Another alpha-tocopherol has also reported in this research (Vitamin E acetate) used in cosmetics industry and bioactivity as represented in Table 1. beta-tocopherol is also found, which contain activity like antioxidant, masking, skin conditioning, cosmetics. gamma-tocopherol is also additionally present, which contain a major bioactivity as described in Table 1. [3] Carveol, 5-isopropenyl-2-methyl-cyclohex-2-enol, is also very valuable terpene flavor and fragrance agent. It also inhibit mammary (carcinogenesis). Cis and Trans careolare also present which works as a flavor and fragrance agent (Crowell et al., 1992; Ramanoelina et al., 2000; Songkro et al., 2011). There

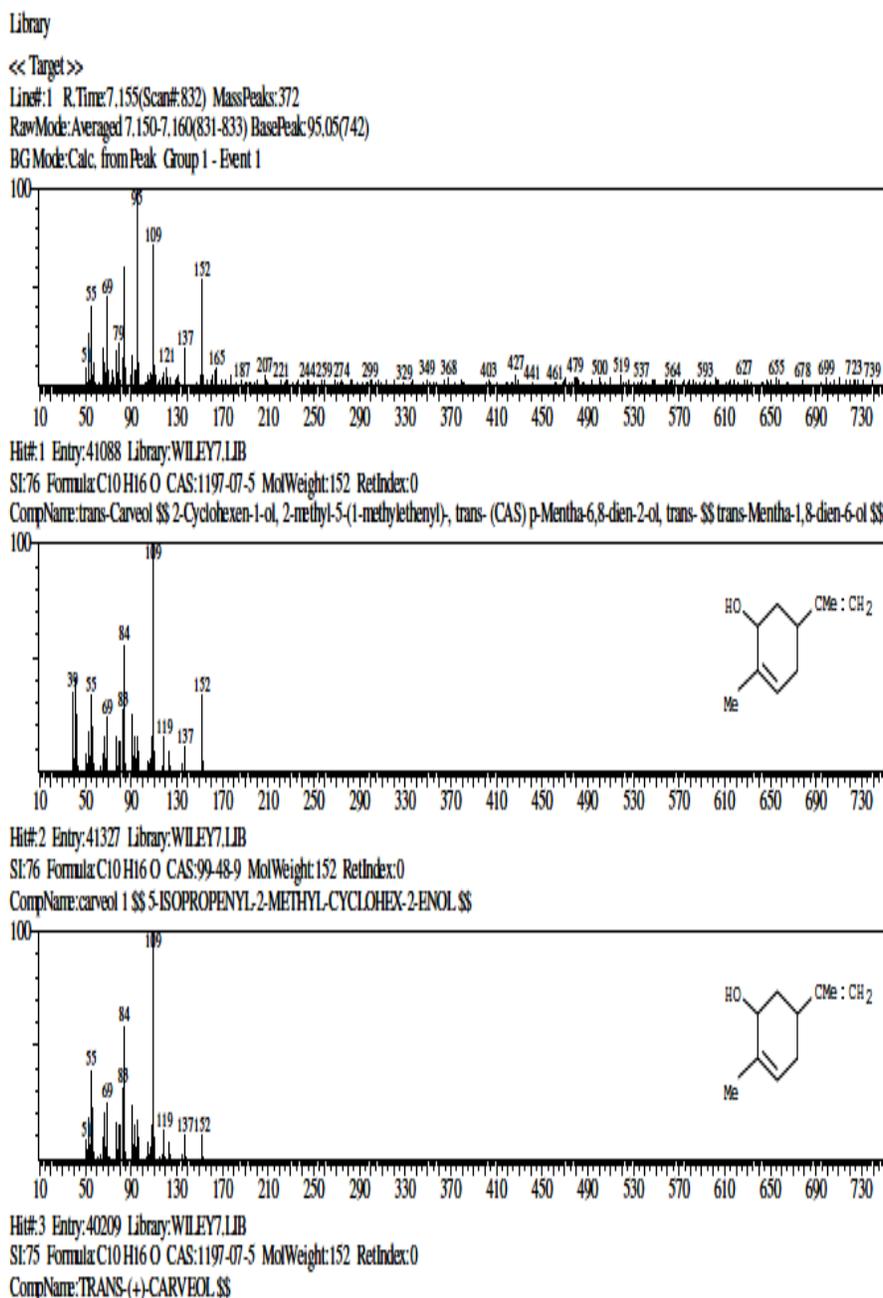
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were also present components γ -sitosterol, stigmast-5-en-3-ol, β -sitosterol, pentadecanal, neophytadien 1, hexadecanol, montanyl alcohol (*n*-Octacosanol) shows various bioactivities as described in Table 2.



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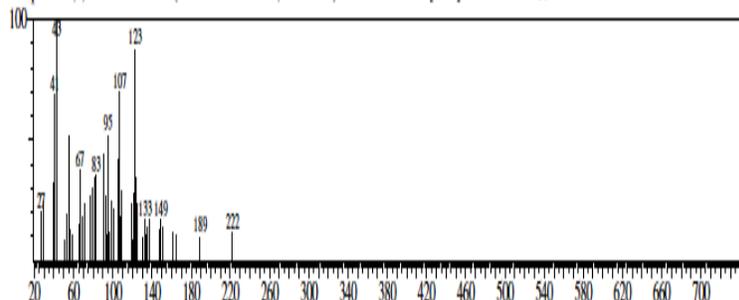
for emulsion polymerization, metal rolling oil, adhesive, lubricants & also in industrial viscosity regulation in cosmetics (Katz *et al.*, 1991). 1-Octadecanol is present which have various uses like that stabilizer, emulsifiers, nutrients, cosmetics, thickening agent detergent industry and also used in pharmaceutical. Other compounds present with ketone functional group compound like that 2-heptanon which also used as a flavor and fragrance agent. This is also used as a solvent for resins, lacquers, cosmetics. It is exhibit anti-bacterial activity. It is considered as an alternative local anesthetic to lidocaine (NIOSH report). Lupeyl acetate works as an anti-diabetic, anti-amylase, anti-microbial, inhibitor. Other compound Bis (2-ethylhexyl) phthalate which act as a plasticizer in plastic industry (PVC), non-polymer formulation. In the matter of carcinogenicity liver tumors, leukaemia is caused by it (Lorz *et al.*, 2007). Various phototoxic compound are also present like that n-heptacosane, n-heneicosane, n-Docosane (Griesbaum *et al.*, 2005) borinediethylmethyl which is synthetic building block (www.lookchem.com).



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SI:71 Formula:C14H22O2 CAS:0-00-0 MolWeight:222 RetIndex:0

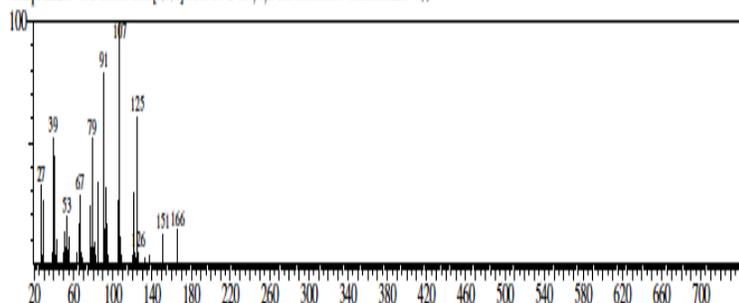
CompName:2,2,6-TRIMETHYL-1-(3-METHYL-BUTA-1,3-DIENYL)-7-OXA-BICYCLO[4.1.0]HEPTAN-3-OL. \$\$



Hit#:2 Entry:55257 Library:WILEY7.LIB

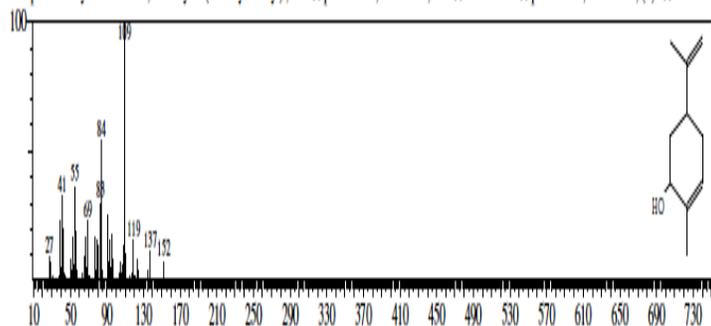
SI:70 Formula:C10H14O2 CAS:0-00-0 MolWeight:166 RetIndex:0

CompName:3-OXABICYCLO[3.3.0]OCTAN-2-ON, 8,8-DIMETHYL-7-METHYLEN- \$\$



SI:75 Formula:C10H16O CAS:1197-06-4 MolWeight:152 RetIndex:1206

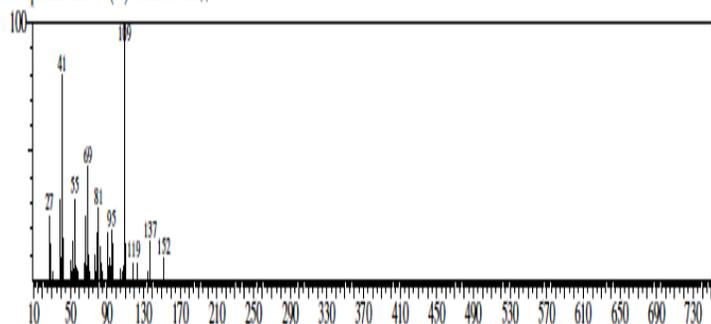
CompName:2-Cyclohexen-1-ol, 2-methyl-5-(1-methylethenyl)-, cis- \$\$ p-Menta-6,8-dien-2-ol, cis- \$\$ cis-Careol \$\$ p-Menta-6,8-dien-2-ol, (Z)- \$\$ cis-2-Me



Hit#:5 Entry:40090 Library:WILEY7.LIB

SI:74 Formula:C10H16O CAS:6909-15-5 MolWeight:152 RetIndex:0

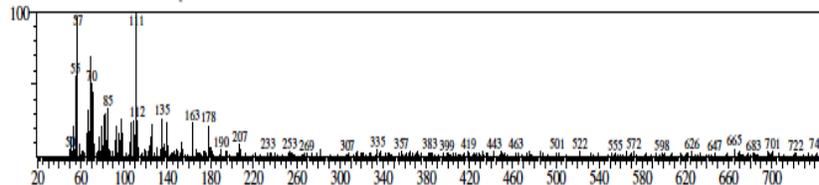
CompName:TRANS-3(10)-CAREN-2-OL. \$\$



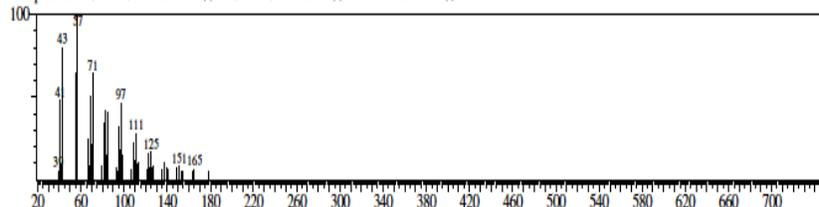
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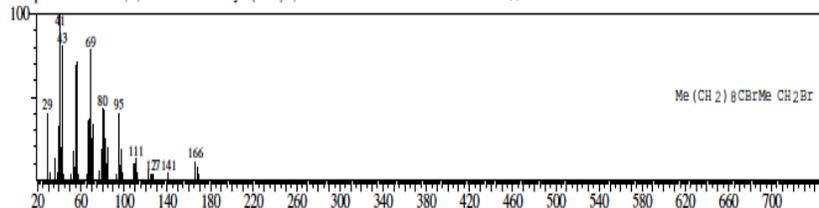
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RawMode:Averaged 8.525-8.535(1106-1108) BasePeak:111.10(977)
BG Mode:Calc. from Peak Group 1 - Event 1



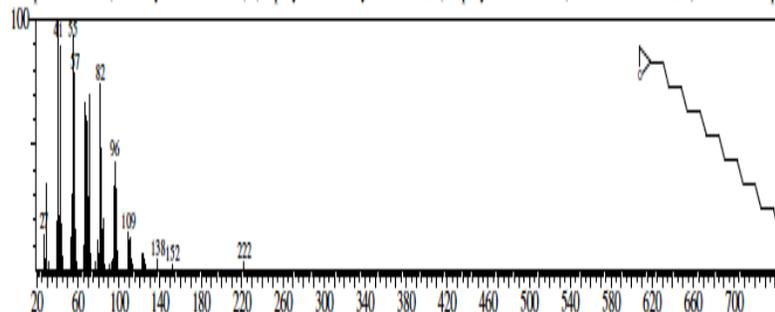
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SI:77 Formula:C21 H36 CAS:0-00-0 MolWeight:288 RetIndex:0
CompName:14.-BETA.-H-PREGNA \$\$ 14.-BETA.-PREGNA \$\$ 14B-PREGNANE \$\$



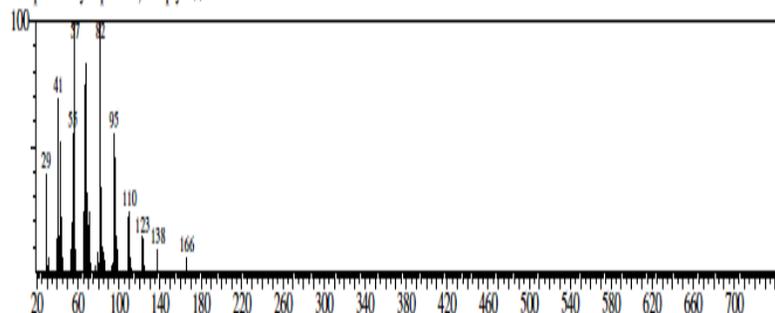
Hit#:2 Entry:234760 Library:WILEY7.LIB
SI:77 Formula:C12 H24 BR2 CAS:55334-43-5 MolWeight:326 RetIndex:0
CompName:Undecane, 1,2-dibromo-2-methyl- (CAS) 1,2-DIBROMO-2-METHYLUNDECANE \$\$



SI:89 Formula:C16H32O CAS:7320-37-8 MolWeight:240 RetIndex:1702
CompName:Oxirane, tetradecyl- \$\$ Hexadecane, 1,2-epoxy- \$\$ Hexadecylene oxide \$\$ 1,2-Epoxyhexadecane \$\$ 1,2-Hexadecane oxide \$\$ 1,2-Hexadecene epox

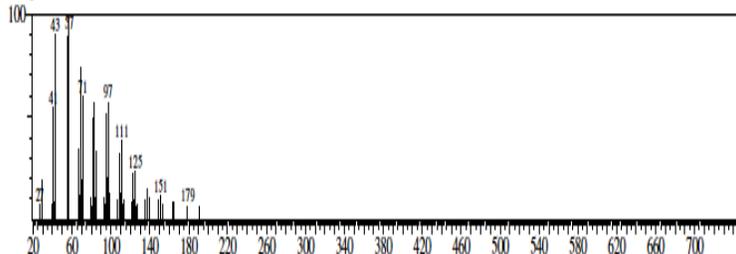


Hit#:5 Entry:55804 Library:WILEY7.LIB
SI:89 Formula:C12 H22 CAS:0-00-0 MolWeight:166 RetIndex:0
CompName:Cyclopentene, 3-heptyl- \$\$

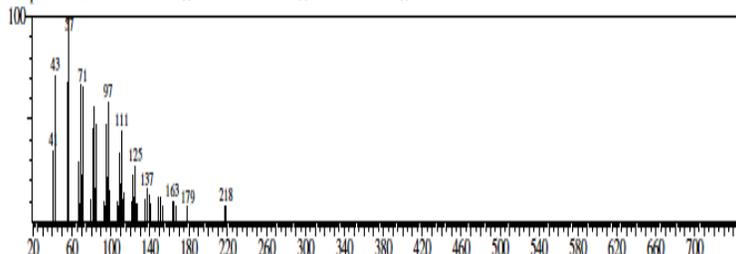


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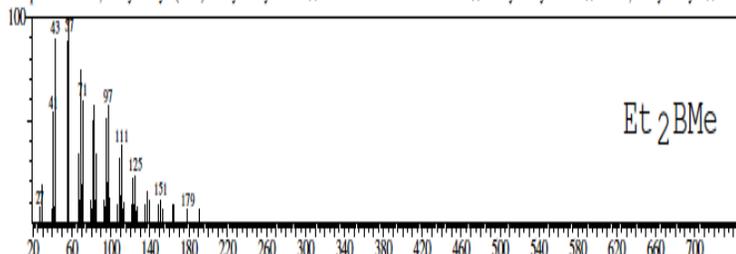
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SI:76 Formula: CAS:0-00-0 MolWeight:9999 RetIndex:0
CompName:HAHNFEIT \$S



Hit#:4 Entry:199740 Library:WILEY7.LIB
SI:76 Formula:C21 H36 CAS:0-00-0 MolWeight:288 RetIndex:0
CompName:14.BETA-H-PREGNA \$S 14.BETA-PRHCNA \$S 14B-PREGNANE \$S

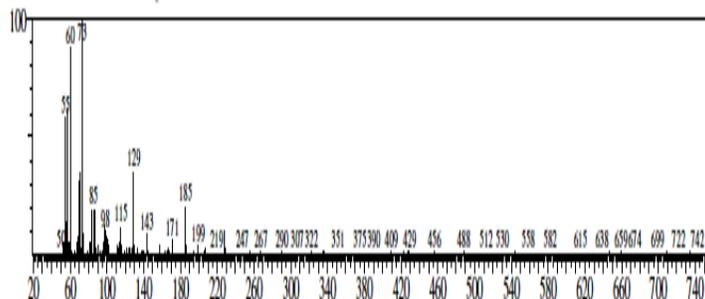


Hit#:5 Entry:2871 Library:WILEY7.LIB
SI:76 Formula:C5 H13 B CAS:1115-07-7 MolWeight:84 RetIndex:0
CompName: Borane, diethylmethyl- (CAS) Methyl-diethylborane \$S DIETHYLMETHYL-BORANE \$S Diethylmethylborane \$S Borane, diethylmethyl- \$S HAH



<< Target >>

Line#:4 R.Time:8.570(Scan#:1115) MassPeaks:389
RawMode:Averaged 8.565-8.575(1114-1116) BasePeak:73.05(4403)
BGMode:Calc. from Peak Group 1 - Event 1



Hit#:1 Entry:20936 Library:NIST11s.lib
SI:95 Formula:C14H28O2 CAS:544-63-8 MolWeight:228 RetIndex:1769
CompName:Tetradecanoic acid \$S Myristic acid \$S n-Tetradecanoic acid \$S n-Tetradecic acid \$S Neo-Fat 14 \$S Univol U 316S \$S 1-Tridecanecarboxylic acid

Figure 2: GC-MS Spectra of CAN Extract

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Table 2: Components Identified and its Activity/Uses in the ACN Extracts of *Abutilon Pannosumby* GC-MS

Sr. No	RT in Minute	Name of Compound	Molecular Formula	Molecular Weight	Peak Area%	Activity and Uses	CAS.No
1	8.572	Tetradecanoic acid	C ₁₄ H ₂₈ O ₂	228	1.15	used in cosmetics, acts as a lipid inchor in bio-membrane, antioxidant, cancer-preventive, lubricant, hypercholesterolemi, flavoring agent	544-63-8
2	8.99	trans-phytol	C ₂₀ H ₄₀ O	296	10.19	flavoring Substance, food industry, preparation of semisynthetic derivative, antimicrobial, anti-diabetic, immunostimulatory, antimicrobial, antidiuretic, anti-cancer, anti-inflammatory, anti-quorum sensing activity in vitro	150-86-7
3	11.499	di-n-octyl phthalate	C ₂₄ H ₃₈ O ₄	390	0.60	plasticizer, used as a synthetic leather.	117-84-0
4	16.23	stigmast-5-en-3-ol	C ₂₉ H ₅₀ O	414	14.10	androgenic, angiogenic, anorexic, antiadenomic, antiandrogenic, antibacterial, anticancer (breast), anticancer (cervix), anticancer (lung), antiedemic, antiestrogenic, antifeedant, antifertility, antigonadotrophic, antihyperlipoproteinaemic, antiinflammatoy, antileukemic, antilymphomic, antimutagenic, antiophidic, antioxidant, antiprogestational, antiprostaglandin, antiprostataadenomic, antiprostatic, antipyretic, antitumor (breast), antitumor (cervix), antitumor (lung), antiviral, apoptotic, artemicide, cancer-preventive, candidicide, caspase-8-inducer, estrogenic, febrifuge, gonadotrophic, hepatoprotective, hypocholesterolemic, hypoglycemic, hypolipidemic, pesticide	83-46-5
5	16.235	gamma sitosterol	C ₂₉ H ₅₀ O ₄	414	14.10	anti-diabetic, anti-angeogenic, anticancer, antimicrobial, anti-inflammatory, anti-diarrhoeal and antiviral	83-47-6

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6.	15.67	stigmasta-5,22-dien-3-ol beta.-stigmasterol	$C_{29}H_{50}O_4$	414	2.91	act as intermediate in biosynthesis of androgens, estrogens, corticoids, anti cancer, anti pyretic, anti inflammatory, immune-modulating effect, precursor synthesis of progesterone, cancer-preventive (ovarian, prostate, breast, colon)	83-48-7
7.	9.42	palmitic acid	$C_{16}H_{32}O_2$	256	9.52	5-alpha reductase, inhibitor, anti-inflammatory, anti-leukotriene, cancer-preventive, hypocholesterolemic, insectifuge properties, antioxidant, flavoring substance, nemacitide.	57-10-3
8.	14.45	dl-.alpha.-tocopherol	$C_{29}H_{50}O_2$	430	5.26	anti-inflammatory, antioxidant, radical scavenging, antispasmodic, antimicrobial, cosmetics, active ingredient, flavor ingredient	10191-41-0
9	12.69	trans-squalene	$C_{30}H_{50}$	410	4.24	anticancer, antimicrobial.	7683-64-9
10	12.69	squalene2,6,10,14, 18,22-tetracosahexaen.	$C_{30}H_{50}$	410	4.24	antioxidant, chemopreventive, pesticide, anti-tumor, sunscreen, synthetic cholesterol, protects skin against UV, anti-arthritic, antistheresclerotic, anti-HIV, cytotoxic activities	111-02-4
11	11.49	bis(2-ethylhexyl) phthalate	$C_{24}H_{38}O_4$	390	0.6	anti-inflammatory, anti-atherosclerotic, anti-neoplastic, neutralize different, xenobiotics, role in skin aging and pathology	117-81-7
12	15.39	ergost-5-en-3-ol, (3.beta.,24R)-campesterol	$C_{28}H_{48}O$	400	1.01	plasticizer, responsible for liver tumors, leukaemia (carcinogenicity)	474-62-4
13	8.99	1,2-hexadecene epoxide	$C_{16}H_{32}O$	240	10.19	antioxidant, hypocholesterolemic,	7320-37-8
14	9.17	Pentadecanal	$C_{15}H_{30}O$	226	2.62	preservative in food, drugs and cosmetics, antifungal against dermatophytes, antitumor, analgesic, antibacterial, anti-inflammatory anticoagulant properties, reduces liver damage, effective in killing cancer cells, treating rheumatoid arthritis	2765-11-9

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15	14.45	alpha tocopherol- acetat	$C_{31}H_{52}O_3$	472	5.26	cosmetics industry, pharmaceutical, dietary supplements(food products)	7695-91-2
16	9.59	2,6,10- dodecatrien-1- ol,3,7,11- trimethyl-) farnesyl alcohol	$C_{15}H_{26}O$	222	1.23	Agriculture (like in cotton, fruits, nuts, Vegetables), decrease in spidermites, major crop pest use, mixture of miticide, pesticide, chemopreventive and anti-tumor effects in vivo, perfumes, flavoring agent	4602-84-0
17	13.89	B-tocopherol	$C_{28}H_{48}O_2$	416	0.57	antioxidant, masking skin conditioning, anti- inflammatory, antimicrobial, estrogenic, insecticidal	148-03-8
18	14.45	alpha,tocopherol	$C_{29}H_{50}O_2$	430	5.26	anti-inflammatory, antioxidant, antimicrobial, radical scavenging, antispasmodic, cosmetics, nutrient	59-02-9
19	10.10	9,12,15- octadecatrienoic acid, (Z,Z,Z)	$C_{18}H_{30}O_2$	278	8.53	anti-inflammatory, hypocholesterolemic, cancer preventive, hepatoprotective, nematicide, insectifuge, antihistaminic, antieczemic, antiacne, 5-alpha reductase inhibitor antiandrogenic, antiarthritic, anticoronary, Insectifuge	463-40-1
20	10.10	9,12,15- octadecatrienoic acid, methyl ester, (Z,Z,Z)	$C_{19}H_{32}O_2$	292	8.53	flavor and fragrance agent, used in oxidation and peroxidation of unsaturated fatty acids	301-00-8
21	12.59	oxirane, 2,2- dimethyl -3- (3,7,12,16,20) pentamethyl	$C_{30}H_{50}O$	426	0.79	intermediate in the cell membrane, inhibitor of lanosterol synthesis	7200-26-2
22	9.03	2-hexadecene, 2,6,10,14- tetramethyl- (phytene)	$C_{20}H_{40}$	280	1.57	volatile compound used in food and beverages, play vital role in the biological molecules such as chlorophy 12, tocopherol, phylloquinone.	56554-34-8

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23	7.15	cis-carveol	C ₁₀ H ₁₆ O	152	0.38	flavor and fragrance agent	1197-06-4
24	14.22	montanylalcohol	C ₂₈ H ₅₈ O	410	0.99	anticancer, choerol lowering effect, anticoagulant, increase stamina improve strength and reaction time for athletes.	557-61-9
25	9.03	1-decene methyl	C ₁₁ H ₂₂	154	1.57	used in polymer industry	61142-79-8
26	9.03	1-hexadecanol	C ₂₀ H ₄₂ O	298	1.57	anti-malarian, antioxidant, antifungal	645-72-7
27	12.16	4,8,12-tetradecatrienal	C ₁₇ H ₂₈ O	248	0.66	great potential for skin diseases.	66408-55-7
28	12.16	Heptacosane	C ₂₇ H ₅₆	380	0.66	reported phototoxic compound	593-49-7
29	13.01	1-eicosanol	C ₂₀ H ₄₂ O	298	1.06	antimalarial, antifungal, antioxidant	629-96-9
30	12.16	n-docosane	C ₂₂ H ₄₆	310	0.66	reported phototoxic compound	629-97-0
31	12.16	Heneicosane	C ₂₁ H ₄₄	296	0.66	reported phototoxic compound	629-94-7
32	14.22	cyclooctacosane	C ₂₈ H ₅₆	392	0.99	reported phototoxic compound	297-24-5
33	14.45	alpha tocopheryl acetate	C ₃₁ H ₅₂ O ₃	472	5.26	antioxidant, beneficial for role for skin (protects cell from free radicals & UV rays), source of vitamin E, dietary products (used to make capsules & tablets)	58-95-7
34	17.06	lupeyl acetate	C ₃₂ H ₅₂ O ₂	468	5.27	anti-diabetic, anti-amylase, antimicrobial, inhibitor	1617-68-1
35	17.06	undec-3-Ene	C ₁₅ H ₂₄	204	5.27	chief components of Cedar wood which is used in medicine and health benefits	38609-30-2
36	17.06	viridiflorol	C ₁₅ H ₂₆ O	222	5.27	flavor and fragrance agent	552-02-3
37	7.15	trans-carveol	C ₁₀ H ₁₆ O	152	0.38	flavor and fragrance agent	1197-07-5
38	9.33	citronellol	C ₁₀ H ₂₀ O	156	0.69	used in perfumes, insects repellents (Mosquito), as a mite attractants, used as raw material (production of rose oxide)	106-22-9
39	8.52	borine, diethylmethyl	C ₅ H ₁₃ B	288	0.59	synthetic building block	1115-07-7

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40	9.33	citronella beta.-citronellal	$C_{10}H_{18}O$	154	0.69	fragrance ingredient, insect repellent, chemical intermediate, used in synthesis, inhibitor.	106-23-0
41	11.49	disooctyl phthalate	$C_{24}H_{38}O_4$	390	0.60	Plasticizer	131-20-4
42	13.01	1-Octadecanol	$C_{18}H_{38}O$	270	1.06	stabilizer, cosmetics, emulsions, ointment base, additives for hair cream conditioners, thickening agent for cosmetics	112-92-5
43	11.24	cyclopentolate	$C_{17}H_{25}NO_3$	291	0.83	used in medical, muscarinic antagonist, act as an atropine substitute to reverse muscarinic and central nervous system, act as an anti-achase.	512-15-2
44	11.24	2-heptanone	$C_7H_{14}O$	114	0.83	flavor and fragrance agent, solvent for resins, cosmetics, reagent for synthesis of rifamycin derivative (antibacterial activity), used in preparation thiazolidin-4-one derivatives (inhibitor), alternative anesthetic	110-43-0
45	18.89	gamma tocopherol	$C_{28}H_{48}O_2$	416	0.57	anti-oxidant, food additives, effective trap for lipophilic electrophiles, significant role in human tissue, anti-inflammatory activity, cancer preventive (Prostate cancer), used in skin bleaching, lightening agent	7616-22-0
46	13.01	1-docosanol	$C_{22}H_{46}O$	326	1.06	flavor and fragrance agent, cosmetics, antiviral agent, raw material for surfactants, plasticizer, lubricants (synthetic resins), adhesives	661-19-8
47	15.39	ergostt-5-en-3.beta.-ol	$C_{28}H_{48}O$	400	0.01	antioxidant, hypocholesterolemic	4651-51-8
48	8.99	neophytadiene	$C_{20}H_{38}$	278	10.19	antipyretic, analgesic, anti-inflammatory, antimicrobial, antioxidant	504-96-1
49	10.20	stearic acid	$C_{18}H_{36}O_2$	284	1.31	vehicle for fat soluble vitamins as – A D E and K	57-11-4

Source : Dr. Duke's data base

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Conclusion

The present study confirms the various bioactive components, phytoconstituents present in ACN leaf extract of plant *Abutilon Pannosum* with the use of GCMS technique. The results show the various type of compound present that contain significant value in our day to day life. Major compound like various acid palmitic acid, stearic acid, tetradecanoic acid that contain particular bioactivities. These have been also present various type of tocopherol that may be useful in many ways. So, in this study various type of compounds identified that have very important value in our normal life as well as in biological point of view. Above tables show that 49 components identified which contain as above various bioactivity and application in various branch of science as well as in various field. There are also present many compounds that contain particular property to develop a novel drug that help to improve human health and especially in treatment of cancer. So, there were many compounds that very useful to mankind in various ways. By use of plant various major and minor amount of compound present as described above. The present study also shows the important of medicinal plant specially *Abutilon Pannosum* in various ways.

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