



## GC-MS ANALYSIS OF DARVYAM UROCARE SYRUP

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## ABSTRACT

The prevalence of urinary tract infections (UTIs) among women, particularly during pregnancy, presents significant health concerns due to potential complications such as pyelonephritis and maternal sepsis. Factors including socioeconomic status, sexual activity, and medical conditions like diabetes and sickle cell trait contribute to the risk of UTIs, emphasizing the importance of effective management strategies. Traditional Ayurvedic texts provide insights into herbal remedies for UTIs, with formulations like *Daruharidra* (*Berberis aristata*) and *Amalaki* (*Emblca officinalis*) recommended for addressing urinary disorders associated with *Pitta dosha* imbalance. These herbs exhibit potent antimicrobial and anti-inflammatory properties attributed to compounds such as berberine and hydrolysable tannins. This study aims to explore the therapeutic potential of Darvyam Urocure syrup, an herbal formulation, for managing UTIs during pregnancy, specifically *Garbhini Mutrakricchra*, through gas chromatography-mass spectrometry (GC-MS) analysis. By identifying and quantifying bioactive compounds in the syrup, this research seeks to elucidate its pharmacological mechanisms and efficacy in UTI management, contributing to evidence-based approaches for maternal health care.

**KEYWORDS:** GCMS, Darvyam Urocure Syrup, Urinary tract infection in pregnancy, Antioxidant, Anti-inflammatory.

## INTRODUCTION

UTIs are common and concerning, particularly for women due to anatomical factors and behaviors like catheterization and sexual activity. They range from mild to severe, with potential complications, but can usually be treated effectively with proper care. During pregnancy, UTIs affect 8-10% of women and pose risks like pyelonephritis.<sup>[1]</sup> Factors such as increasing parity, socioeconomic status, age, sexual activity, sickle cell trait, and diabetes raise the risk of asymptomatic bacteriuria, which can lead to pyelonephritis in 30-40% of cases. UTIs are a significant cause of maternal sepsis, especially among African-American multiparas with sickle-cell trait. The term "*Mutrakricchra*" originates from the combination of two Sanskrit words: "*Mutra*," meaning urine, and "*Kricchra*," meaning difficulty or distress.<sup>[2]</sup> Together, "*Mutrakricchra*" refers to the condition of urinary difficulty or discomfort. According to the *Vachaspathyam*, the word "*Mutra*" is derived from the root "*Mu- Mive-Srave*" *dhatu*, which, when suffixed by "*Kr*" (*Churadi Varga*), gives rise to the word "*Mutra*." It signifies urine or a fluid stored in the bladder or secreted by the kidneys. In the framework of the term "*Mutra*," stemming from the root "*Mutra*" with the suffix

"*Dhacha*," it pertains distinctly to the fluid waste originating from the gastrointestinal tract, commonly referred to as "*Drava Anna Mala*." This corresponds with contemporary urological comprehension, wherein urine is recognized as the liquid nitrogenous waste of the body, and urobilinogen, a constituent of urine, originates directly from the gastrointestinal tract. The term "*Kricchra*" is derived from the root "*Krt-Karane*" *Dhatu*, which, when suffixed by "*Ruk*," signifies *Dukha*, or pain, resulting in the word "*Kricchra*." In essence, "*Kricchra*" denotes trouble, pain, or difficulty, often accompanied by great exertion or with considerable hardship.

In *Charak Chikitsa Sthana* Chapter 26, *Daruharidra* (*Berberis aristata*) and *Amalaki* (*Emblca officinalis*) with honey are recommended for treating urinary disorders associated with *Pitta dosha* imbalance, specifically known as *Pittaja Mutrakricchra Chikitsa*.<sup>[3]</sup>

*Emblca officinalis*, known as *Amlaki*, exhibits potent antiviral properties akin to interferon. It effectively treats conditions like acute viral hepatitis. Additionally, it shows significant antibacterial effects against *S. aureus* and *E. coli*. *Amla* extracts, both aqueous and crude, also

demonstrate remarkable antifungal activity against *Candida albicans* and dermatophytes like *Epidermophyton floccosum*, *Microsporum gypsum*, and *Trichophyton brum*. These therapeutic effects are attributed to its high content of low molecular weight hydrolysable tannins, including Emblicanin A (27%), Emblicanin B (23%), Penigloconin (8%), Pedunculagin (14%), gallo ellagitannoids (10-30%), and rutin (10%).<sup>[4]</sup>

*Berberis aristata*, or *B. aristata (Daruharidra)*, boasts potent antimicrobial properties effective against a wide range of pathogens including bacteria, fungi, protozoans, helminths, chlamydia, and viruses. The alkaloid berberine, found in *B. aristata*, exhibits antimicrobial activity against both gram-positive and gram-negative bacteria, including *M. tuberculosis*, *T. mentagrophytes*, and *E. coli*. Additionally, berberine inhibits HIV-1 reverse transcriptase and demonstrates direct

antibacterial effects on *V. cholerae*. Moreover, it suppresses the intestinal secretion response to *E. coli* heat-stable enterotoxin.<sup>[5]</sup>

This study aims to identify components in Darvyam Urocare syrup with equivalent therapeutic effects for *Garbhini Mutrakrichra* through GCMS Analysis. GC-MS is vital for identifying and quantifying compounds in mixtures with high sensitivity and selectivity. Its structural elucidation capabilities, reliability, and wide range of applications make it indispensable in various fields.<sup>[6]</sup>

## MATERIALS AND METHODS

The raw drug fruit of *Amalaki* and root of *Daruharidra* were collected and got authenticated. The Darvyam Urocare Syrup was prepared in GMP-approved well established Pharmacy.

## Ingredients<sup>[7]</sup>

Sr. No.	Drug Name	Botanical Name	Part Used
1.	<i>Amalaki</i>	<i>Emblica officinalis</i>	Fruit
2.	<i>Daruharidra</i>	<i>Berberis Aristata</i>	Root
3.	Sugar	-	-
4.	Vanilla Essence	-	-
5.	Honey	-	-

## Procedure

### 1. Preparation of *kwatha*

*Daruharidra* and *Amalaki* are individually ground into powders and mixed with water in a 1:16 ratio by weight. Each mixture is then boiled, simmered, and strained to produce separate *kwathas*.

### 2. Preparation of syrup<sup>[8]</sup>

Both *kwathas* were combined and heated in a wide-bottomed vessel until significantly reduced, aiming for a concentrated extract. Sugar syrup was added to enhance stability, palatability, and shelf life, followed by dilution with water in a 1:5 ratio. The resulting mixture was refined to create a concentrated and standardized herbal syrup with improved bioavailability and therapeutic benefits.

After cooling, honey and vanilla essence were added to enhance taste, provide therapeutic benefits, and preserve naturally. The syrup was then bottled carefully for easy storage, dispensing, and preservation without preservatives. Subsequently, the prepared syrup underwent thorough analytical testing, including Gas Chromatography-Mass Spectrometry (GCMS) analysis, to identify active and marker compounds, ensuring adherence to standards.

## GC-MS (Gas chromatography mass spectroscopy)

The GCMS analysis of Darvyam Urocare Syrup was conducted at the Sophisticated Instrumentation Centre for Applied Research and Testing (SICART) in Anand, Gujarat.

## Preparation of Sample for GC-MS

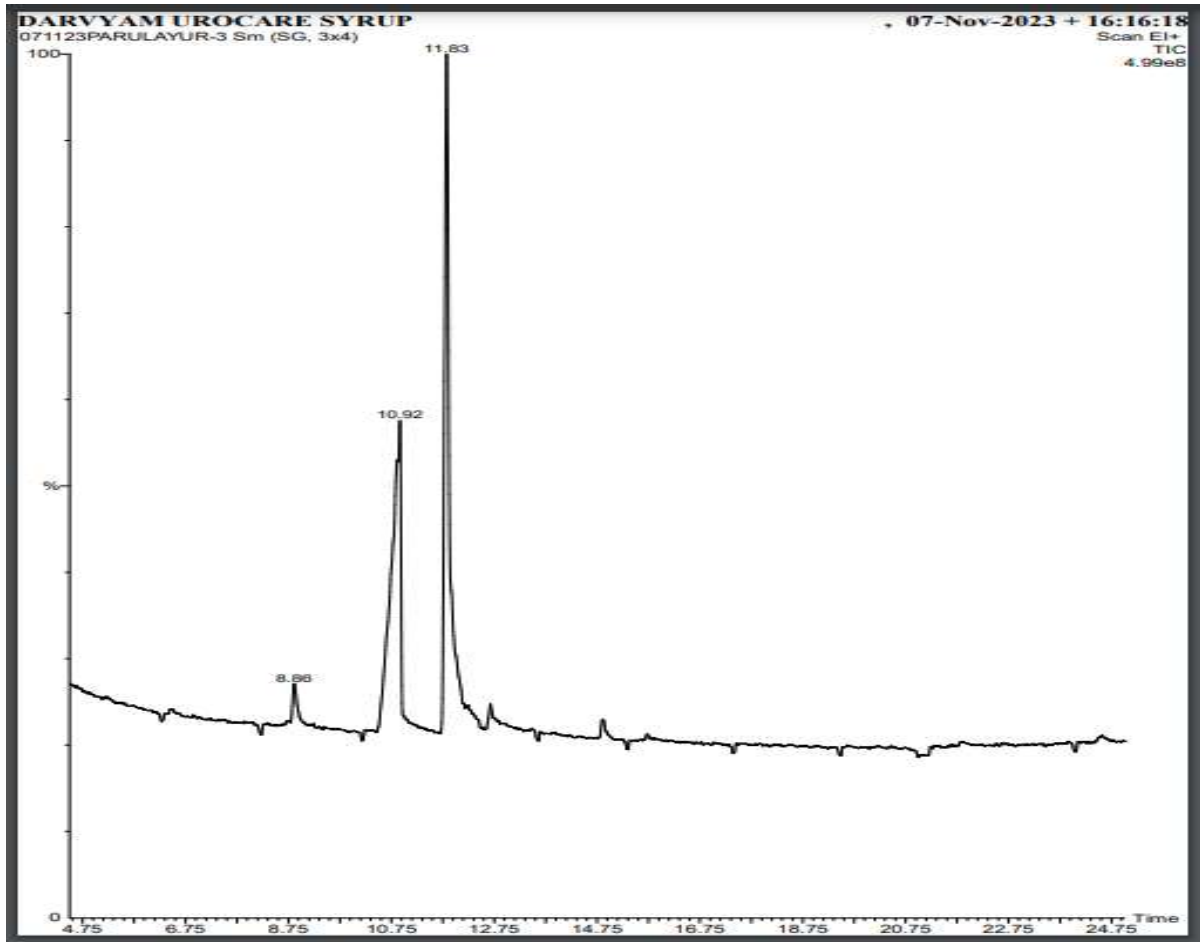
- Instrument Model: Perkin Elmer AUTO 6M TURBOMASS
- Sample Injection Temperature: 250°C
- Oven Temperature: Programmed to start at 75°C, ramped at a rate of 10°C/min until reaching 270°C, then held for 10 minutes
- Capillary Column: PE-5AP
- Length: 30 meters
- Inner Diameter (ID): 0.250 microns
- Thickness: 0.25mm
- Injector Temperature: 250°C
- Electron Ionization (EI) Source Temperature: 220°C
- Mass Range: 20-610 AMU (Atomic Mass Units)
- Carrier Gas: Helium gas

OBSERVATIONS

**SICART  
GC-MS REPORT**

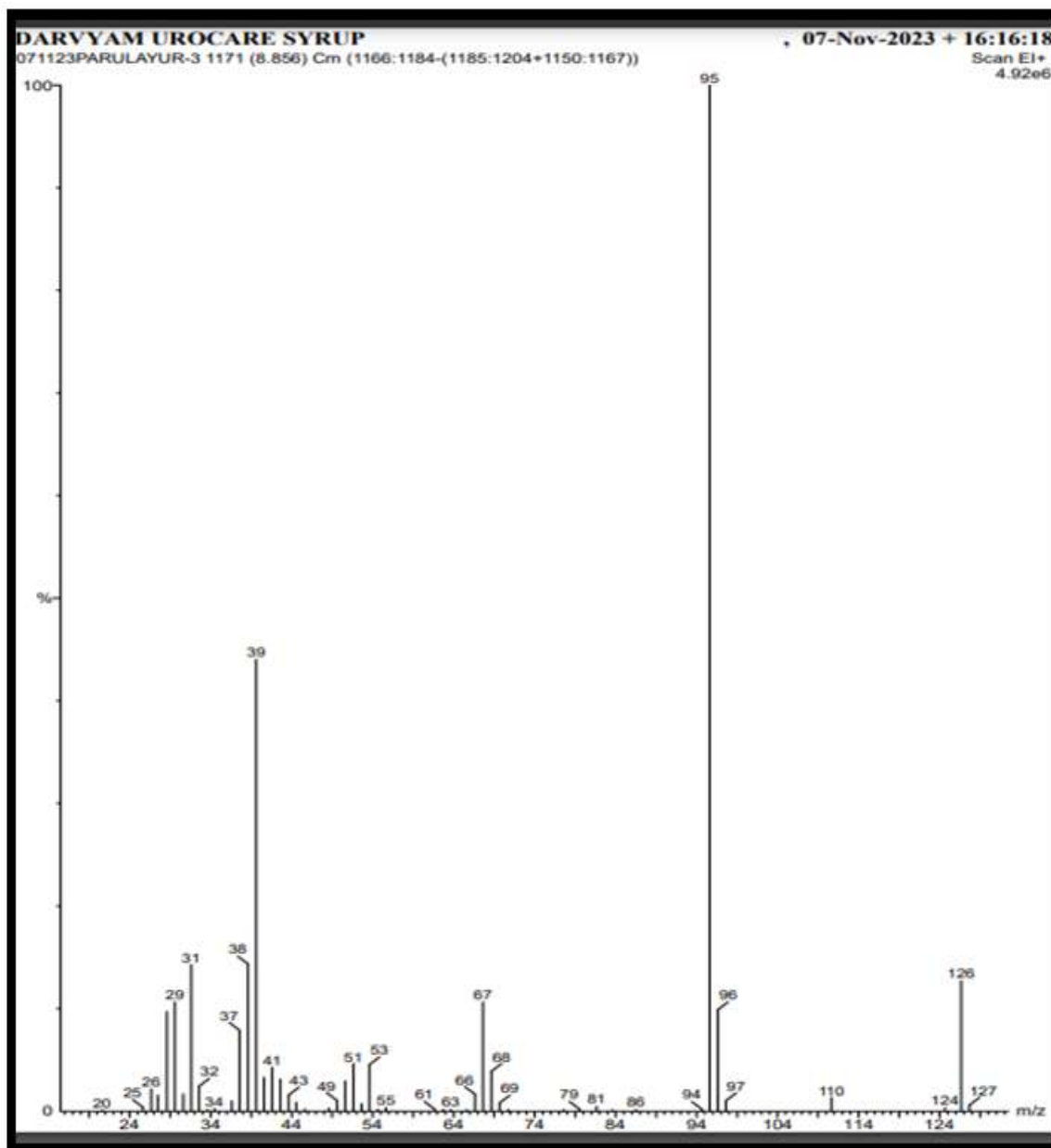
071123PARULAYUR-3 RAW DARVYAM UROCARE SYRUP

Sr.No	RT	COMPONENTS NAME	AREA	%AREA
1	8.861	1	1975289	2.243960035
2	10.917	2	37241352	42.30677411
3	11.827	3	46852560	53.22526079
4	12.672	4	1132584.625	1.286634328
5	14.863	5	825138.625	0.937370733
<b>TOTAL AREA</b>			<b>88026924.25</b>	

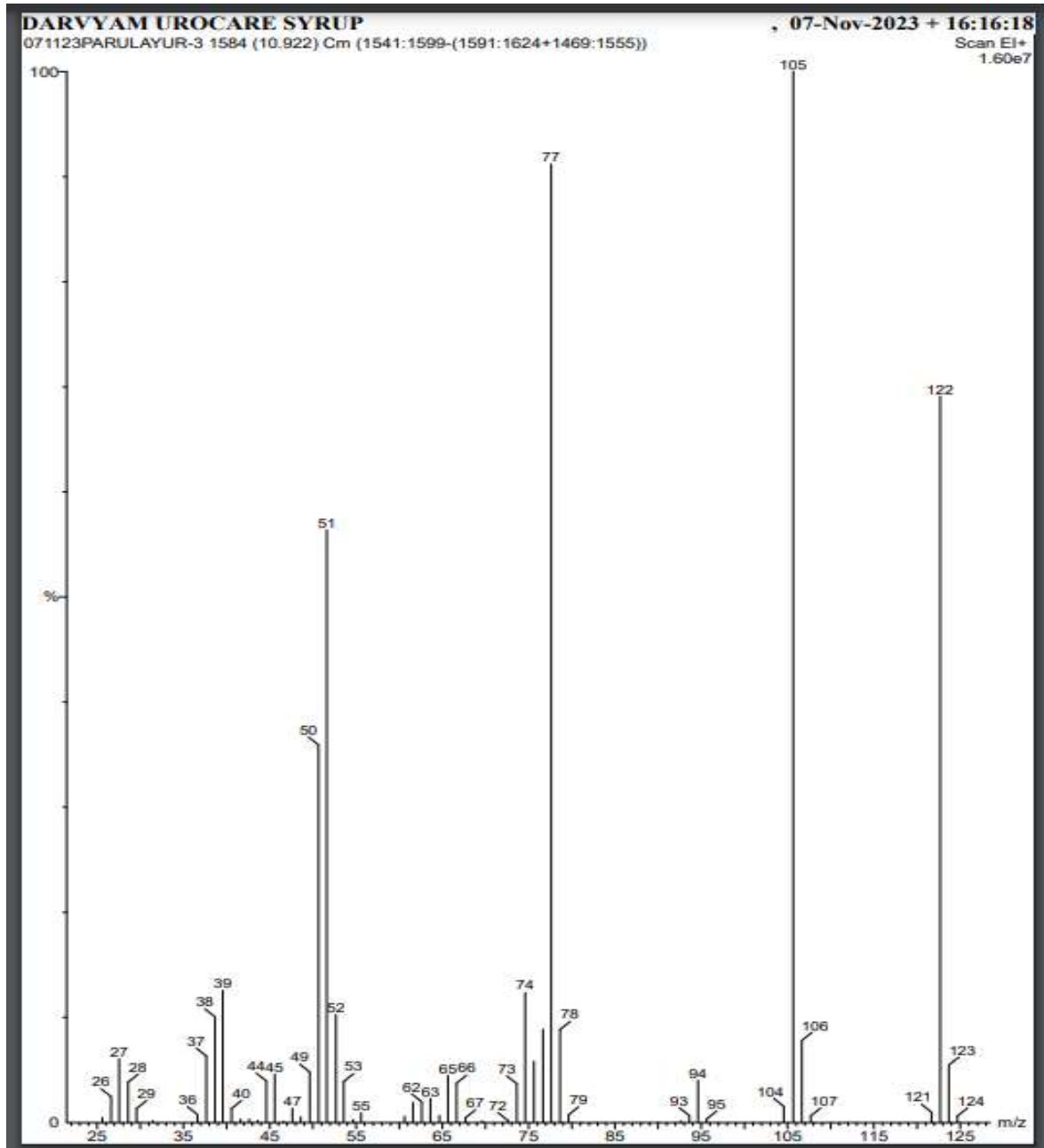


**DARVYAM UROCARE SYRUP** **071123PARULAYUR-3**

RI	RFV	IR	Compound Name	MW	Formula	CAS
1	962	883	FURYL HYDROXYMETHYL KETONE	126	C <sub>8</sub> H <sub>8</sub> O <sub>3</sub>	17678-19-2
2	926	866	METHYL 2-FUROATE	126	C <sub>8</sub> H <sub>8</sub> O <sub>3</sub>	811-13-2
3	917	870	2-FURAN CARBOXYLIC ACID, HYDRAZIDE	126	C <sub>8</sub> H <sub>8</sub> O <sub>2</sub> N <sub>2</sub>	3326-71-4
4	913	868	4-PYRIDINOL	95	C <sub>5</sub> H <sub>5</sub> ON	626-64-2
5	898	870	METHYL 2-FUROATE	126	C <sub>8</sub> H <sub>8</sub> O <sub>3</sub>	811-13-2
6	889	875	METHYL 2-FUROATE	126	C <sub>8</sub> H <sub>8</sub> O <sub>3</sub>	811-13-2
7	879	854	3-FURAN CARBOXYLIC ACID, METHYL ESTER	126	C <sub>8</sub> H <sub>8</sub> O <sub>3</sub>	13129-23-2
8	864	747	PHENDOL, 2-(2-FURYL)2-PYRIDOYLAMINO/METHYL-	267	C <sub>15</sub> H <sub>13</sub> O <sub>2</sub> N <sub>2</sub>	800282-80-0
9	854	763	2-FURYLACETONITRILE	135	C <sub>7</sub> H <sub>6</sub> O <sub>2</sub> N	800343-47-6
10	823	705	2-NORBORNYL BROMIDE	174	C <sub>7</sub> H <sub>11</sub> Br	29342-65-2
11	818	711	FURYL HYDROXYMETHYL KETONE	126	C <sub>8</sub> H <sub>8</sub> O <sub>3</sub>	17678-19-2
12	817	706	EXO-2-BROMONORBORNANE	174	C <sub>7</sub> H <sub>11</sub> Br	2534-77-2
13	809	789	ACRYLIC ACID, 3-AMINO-3-CYANO-, METHYL ESTER	126	C <sub>8</sub> H <sub>8</sub> O <sub>2</sub> N <sub>2</sub>	26740-50-1
14	808	699	EXO-2-BROMONORBORNANE	174	C <sub>7</sub> H <sub>11</sub> Br	2534-77-2
15	807	764	1H-IMIDAZOLE-4-CARBOXYLIC ACID, METHYL ESTER	126	C <sub>8</sub> H <sub>8</sub> O <sub>2</sub> N <sub>2</sub>	17325-26-7
16	793	710	1H-IMIDAZOLE-4-CARBOXYLIC ACID, METHYL ESTER	126	C <sub>8</sub> H <sub>8</sub> O <sub>2</sub> N <sub>2</sub>	17325-26-7
17	790	710	2-PYRIDINAMINE	95	C <sub>6</sub> H <sub>6</sub> N <sub>2</sub>	100-12-6
18	779	725	IMIDAZOLE, 5-HYDRAZINOCARBONYL-	126	C <sub>4</sub> H <sub>6</sub> O <sub>4</sub> N <sub>4</sub>	18329-78-7
19	771	705	ETHANONE, 1-(2-FURANYL)-	110	C <sub>8</sub> H <sub>8</sub> O <sub>2</sub>	1192-62-7
20	746	659	1-BROMOMETHYL-2-CHLOROCYCLOHEXANE	210	C <sub>7</sub> H <sub>12</sub> ClBr	80009-23-7

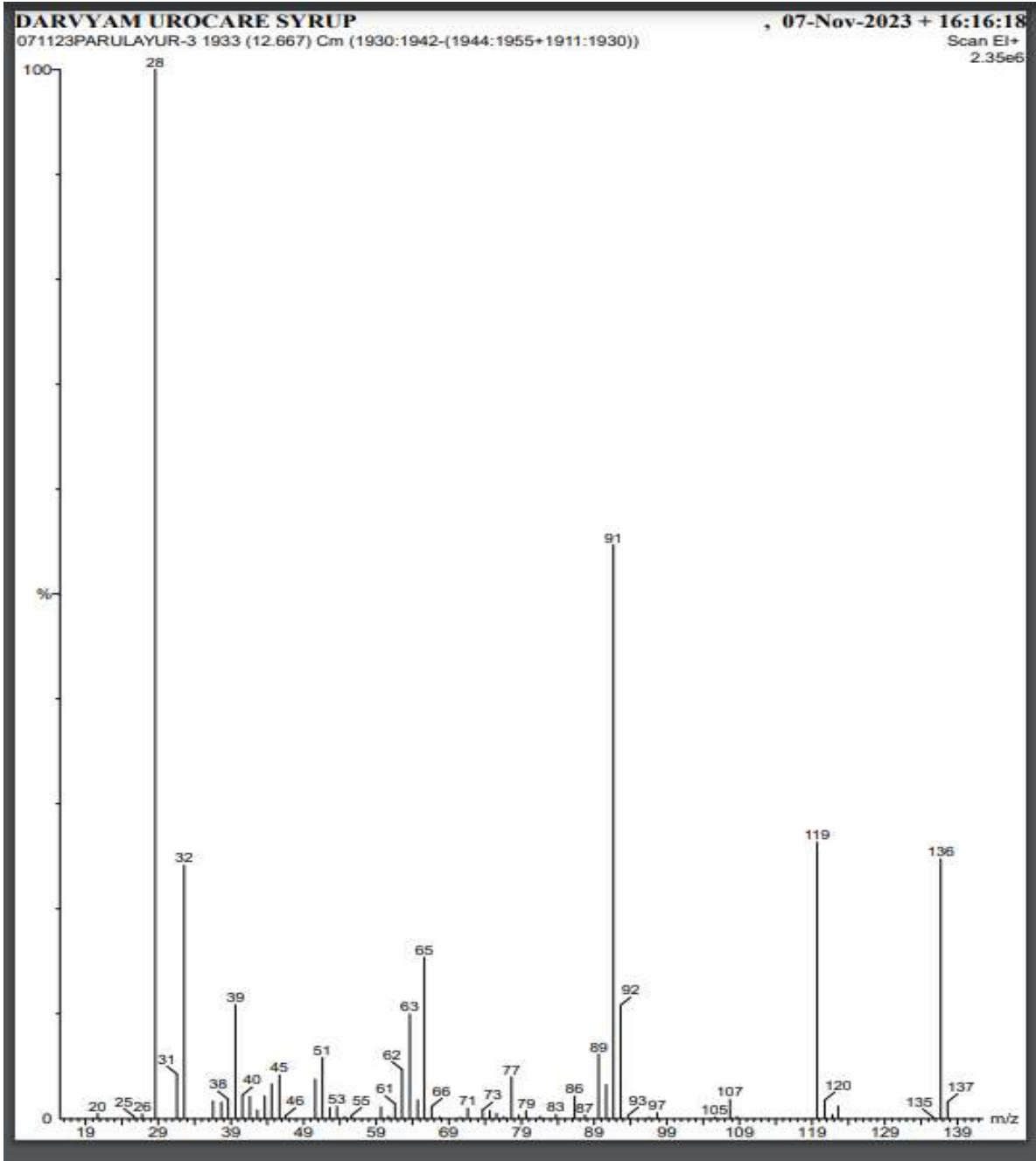


DARVYAM UROCARE SYRUP				071123PARULAYUR-3		
HI	REV	for	Compound Name	M.W.	Formula	CAS
1	986	977	BENZOIC ACID	122	C7H6O2	65-85-0
2	980	976	BENZOIC ACID	122	C7H6O2	65-85-0
3	978	921	CYCLOBUTANE-1,1-DICARBOXAMIDE, N,N-DI-BENZOYLOXY-	382	C20H18O6N2	900253-25-3
4	977	971	BENZOIC ACID	122	C7H6O2	65-85-0
5	975	970	BENZOIC ACID	122	C7H6O2	65-85-0
6	968	908	HEPTANEDIAMIDE, N,N-DI-BENZOYLOXY-	398	C21H22O6N2	900253-29-4
7	950	739	BENZOYL BROMIDE	184	C7H5OBr	618-32-6
8	936	740	BENZOYL BROMIDE	184	C7H5OBr	618-32-6
9	936	890	BENZOIC ACID, SILVER(1+) SALT	228	C7H5O2Ag	532-31-0
10	929	705	BENZENEPROPANENITRILE, BETA-OXO-	145	C9H7ON	614-16-4
11	927	721	1-PROPANONE, 2-BROMO-1-PHENYL-	212	C9H9OBr	2114-00-3
12	925	732	BENZOYL BROMIDE	184	C7H5OBr	618-32-6
13	925	918	METHANOL, OXO-, BENZOATE	150	C8H8O3	90006-85-2
14	924	731	PHENYLGLYOXAL	134	C8H6O2	1074-12-0
15	922	898	PROPAN-1-ONE, 3-NITRO-1-PHENYL-	179	C9H9O3N	62847-52-3
16	918	890	4-PIPERIDINEPROPANOIC ACID, 1-BENZOYL-3-(2-CHLOROETHYL), ETHYL ESTER	351	C19H28O3NCl	77572-89-1
17	918	703	BENZOYL CHLORIDE	140	C7H5OCl	98-88-4
18	911	710	BENZOYL CHLORIDE	140	C7H5OCl	98-88-4
19	909	715	BENZENEPROPANENITRILE, BETA-OXO-	145	C9H7ON	614-16-4
20	909	724	BENZENEACETIC ACID, ALPHA-OXO-, METHYL ESTER	164	C9H8O3	15206-55-0

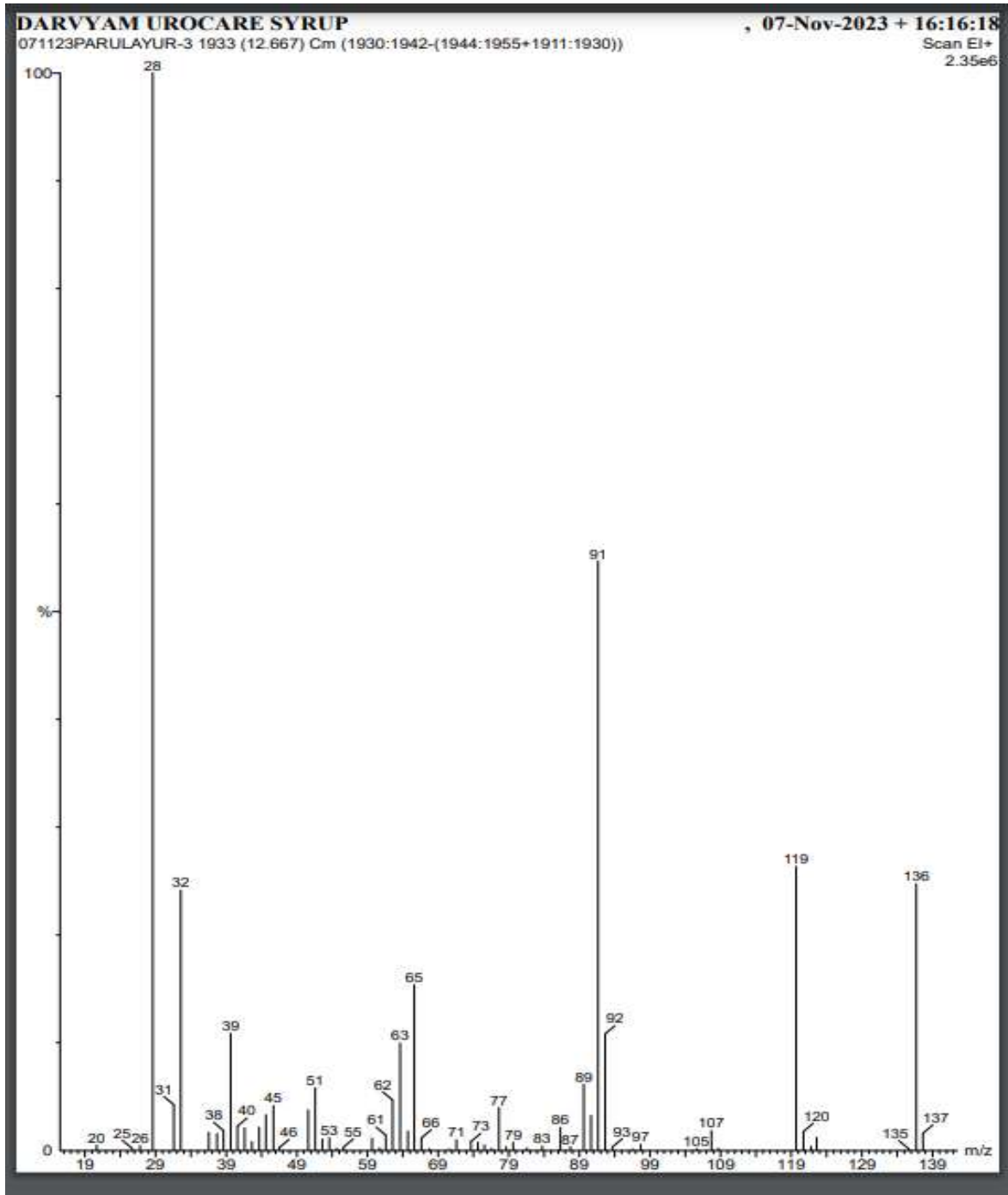


DARVYAM UROCARE SYRUP				071123PARULAYUR-3		
HI	REV	ICR	Compound Name	M.W.	Formula	CAS
1	986	977	BENZOIC ACID	122	C7H6O2	65-85-0
2	980	976	BENZOIC ACID	122	C7H6O2	65-85-0
3	978	921	CYCLOBUTANE-1,1-DICARBOXAMIDE, N,N-DI-BENZOYLOXY-	382	C20H18O6N2	900253-25-3
4	977	971	BENZOIC ACID	122	C7H6O2	65-85-0
5	975	970	BENZOIC ACID	122	C7H6O2	65-85-0
6	958	908	HEPTANEDIAMIDE, N,N-DI-BENZOYLOXY-	398	C21H22O6N2	900253-26-4
7	950	739	BENZOYL BROMIDE	184	C7H5OBr	618-32-6
8	936	740	BENZOYL BROMIDE	184	C7H5OBr	618-32-6
9	936	890	BENZOIC ACID, SILVER(1+) SALT	228	C7H5O2Ag	532-31-0
10	929	705	BENZENEPROPANENITRILE, BETA-OXO-	145	C9H7ON	614-16-4
11	927	721	1-PROPANONE, 2-BROMO-1-PHENYL-	212	C9H8OBr	2114-00-3
12	926	732	BENZOYL BROMIDE	184	C7H5OBr	618-32-6
13	925	918	METHANOL, OXO-, BENZOATE	150	C8H8O3	900305-85-2
14	924	731	PHENYLGLYOXAL	134	C8H6O2	1074-12-0
15	922	898	PROPAN-1-ONE, 3-NITRO-1-PHENYL-	179	C9H9O3N	62847-52-3
16	918	890	4-PIPERIDINEPROPANOIC ACID, 1-BENZOYL-3-(2-CHLOROETHYL), ETHYL ESTER	351	C19H26O3NCl	77572-89-1
17	918	703	BENZOYL CHLORIDE	140	C7H5OCl	98-88-4
18	911	710	BENZOYL CHLORIDE	140	C7H5OCl	98-88-4
19	909	715	BENZENEPROPANENITRILE, BETA-OXO-	145	C9H7ON	614-16-4
20	909	724	BENZENEACETIC ACID, ALPHA-OXO-, METHYL ESTER	164	C9H8O3	15206-55-0



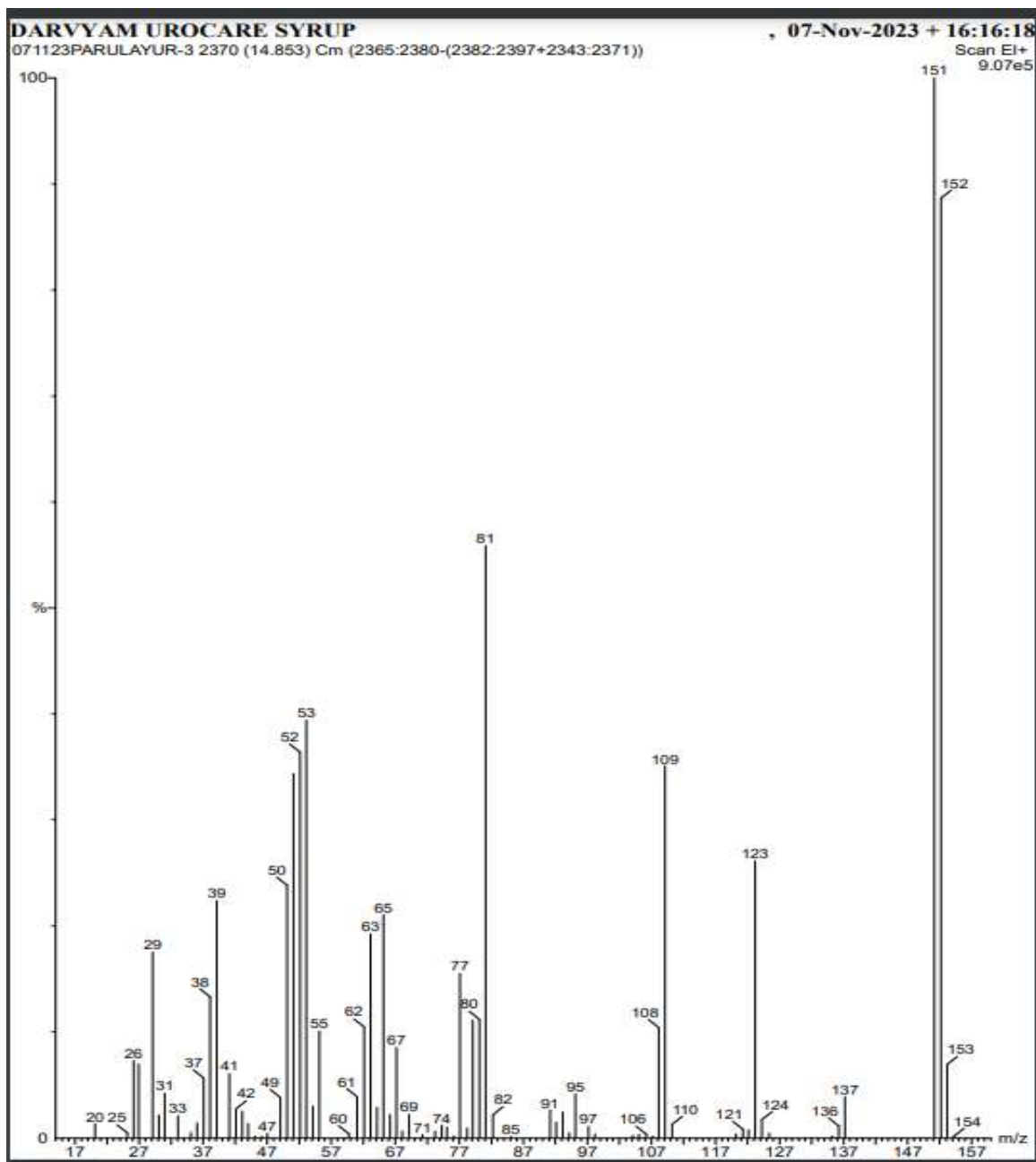


Sl. No.	REV	for	Compound Name	M.W.	Formula	CAS
1	959	954	5-HYDROXYMETHYLFURFURAL	126	C8H8O3	67-47-0
2	933	925	5-HYDROXYMETHYLFURFURAL	126	C8H8O3	67-47-0
3	932	925	5-HYDROXYMETHYLFURFURAL	126	C8H8O3	67-47-0
4	841	791	4-HEXEN-3-ONE, 4,5-DIMETHYL-	126	C8H14O	17325-90-5
5	835	795	4-HEPTEN-3-ONE, 4-METHYL-	126	C8H14O	22319-31-9
6	779	688	2-FURANMETHANOL	98	C5H8O2	96-00-0
7	767	647	2-CYCLOHEXEN-1-OL, 3-BROMO-	178	C8H16Br	108565-64-4
8	761	689	3H-PYRAZOL-3-ONE, 2,4-DIHYDRO-4,4,5-TRIMETHYL-	126	C8H10N2	3201-20-5
9	761	709	1-ETHYL-2-HYDROXYMETHYLIMIDAZOLE	126	C8H10N2	63634-44-6
10	751	648	3-FURANMETHANOL	98	C5H8O2	4412-91-3
11	749	656	1-ETHYL-2-HYDROXYMETHYLIMIDAZOLE	126	C8H10N2	63634-44-6
12	741	640	2-FURANMETHANOL	98	C5H8O2	96-00-0
13	733	680	4-HEPTEN-3-ONE, 2,6-DIMETHYL-	140	C9H18O	56259-14-4
14	732	697	4-HEPTEN-3-ONE, 5-METHYL-	128	C8H14O	1447-26-3
15	731	629	2-FURANMETHANOL	98	C5H8O2	96-00-0
16	720	620	3-FURANMETHANOL	98	C5H8O2	4412-91-3
17	681	486	1H-IMIDAZOLE, 2-(DIETHOXYMETHYL)-	170	C8H14O2N2	13750-84-0
18	677	529	3H-PYRAZOL-3-ONE, 2,4-DIHYDRO-4,4,5-TRIMETHYL-	126	C8H10N2	3201-20-5
19	674	610	3H-PYRAZOL-3-ONE, 2,4-DIHYDRO-4,4,5-TRIMETHYL-	126	C8H10N2	3201-20-5
20	674	651	PHENYLTHIO 4-METHYLPENT-3-ENOATE	206	C12H14OS	102496-83-3



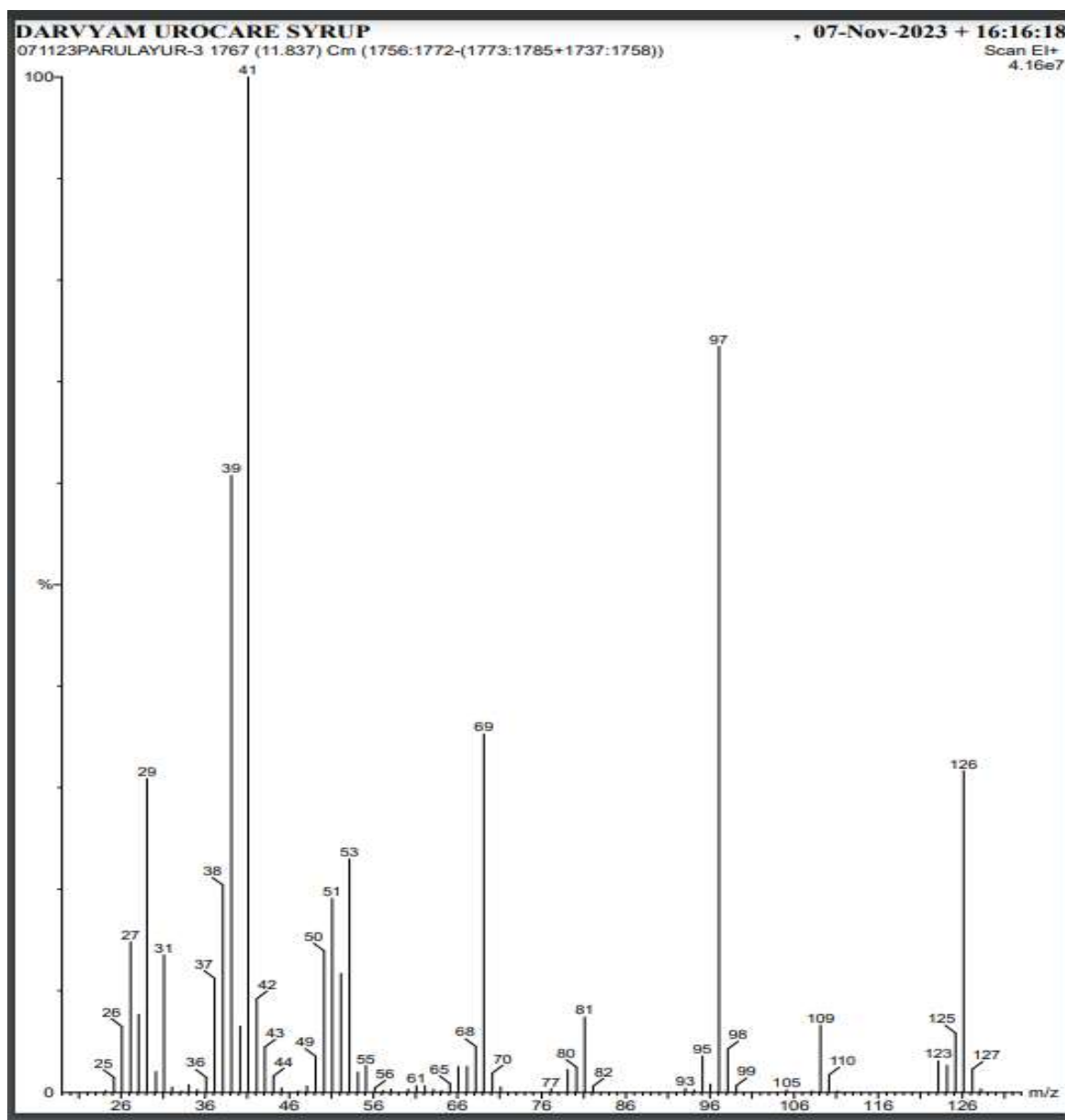
**DARVYAM UROCARE SYRUP** 071123PARULAYUR-3

#	REV	for	Compound Name	M.W.	Formula	CAS
1	961	917	BENZOIC ACID, 4-METHYL-	136	C8H8O2	99-94-5
2	956	928	BENZOIC ACID, 4-METHYL-	136	C8H8O2	99-94-5
3	948	904	BENZOIC ACID, 4-METHYL-	136	C8H8O2	99-94-5
4	938	703	PROPANEDIOIC ACID, PHENYL-	180	C8H8O4	2513-89-0
5	929	878	BENZOIC ACID, 3-METHYL-	136	C8H8O2	99-04-7
6	928	868	BENZOIC ACID, 3-METHYL-	136	C8H8O2	99-04-7
7	916	872	BENZOIC ACID, 4-METHYL-	136	C8H8O2	99-94-5
8	910	862	(+)-DI-D-4-TOLUOYL-D-TARTARIC ACID	368	C20H18O8	32034-88-7
9	906	860	BENZOIC ACID, 4-METHYL-	136	C8H8O2	99-94-5
10	904	845	BENZOIC ACID, 3-METHYL-	136	C8H8O2	99-04-7
11	903	723	BENZENEACETIC ACID	136	C8H8O2	103-82-2
12	874	681	3-OXO-4-PHENYLBUTYRONITRILE	159	C10H9ON	10212-27-2
13	857	779	BENZOIC ACID, 4-METHYL-, PROPYL ESTER	178	C11H14O2	8976-69-8
14	854	788	P-TOLUIC ACID, ALLYL ESTER	178	C11H12O2	2653-45-5
15	853	804	ETHYL 4-METHYLBENZOATE	164	C10H12O2	94-08-6
16	823	756	ETHYL 4-METHYLBENZOATE	164	C10H12O2	120-33-2
17	818	731	BUTANEDIOIC ACID, 2,3-BIS[(4-METHYLBENZOYL)OXY]-, [R-(R',R'')]	368	C20H18O8	32634-88-5
18	816	753	ETHYL 4-METHYLBENZOATE	164	C10H12O2	94-08-6
19	813	657	OXIRANE, PHENYL-	120	C8H8O	96-09-3
20	806	639	OXIRANE, PHENYL-	120	C8H8O	96-09-3



Sl. No.	REV	for	Compound Name	M.W.	Formula	CAS
1	074	070	VANILLIN	152	C8H8O3	121-33-5
2	049	035	VANILLIN	152	C8H8O3	121-33-5
3	047	033	VANILLIN	152	C8H8O3	121-33-5
4	034	018	BENZALDEHYDE, 3-HYDROXY-4-METHOXY-	152	C8H8O3	621-59-0
5	023	006	4-HYDROXY-3-METHOXYBENZALDEHYDE	152	C8H8O3	18278-34-7
6	019	000	BENZALDEHYDE, 3-HYDROXY-4-METHOXY-	152	C8H8O3	621-59-0
7	002	070	BENZALDEHYDE, 3-(CHLOROACETOXY)-4-METHOXY-	228	C10H9O4Cl	66207-38-7
8	088	053	BENZALDEHYDE, 3-HYDROXY-4-METHOXY-	152	C8H8O3	621-59-0
9	073	051	VANILLIN	152	C8H8O3	121-33-5
10	089	052	VANILLIN, ACETATE	194	C10H10O4	881-68-5
11	071	037	VANILLIN, ISOPROPYL ETHER	194	C11H14O3	900395-32-3
12	053	017	4-ETHOXY-3-ANISALDEHYDE	180	C10H12O3	120-25-2
13	049	018	VANILIC ACID HYDRAZIDE	182	C8H10O3N2	100377-63-7
14	046	006	BENZALDEHYDE, 2-HYDROXY-5-METHOXY-	152	C8H8O3	672-13-9
15	044	008	VANILLIN, ACETATE	194	C10H10O4	881-68-5
16	038	006	BENZALDEHYDE, 2-HYDROXY-5-METHOXY-	152	C8H8O3	672-13-9
17	030	010	1H-PYRROLO[2,3-B]PYRIDINE-2,6-DIONE, 3,3A,4,5-TETRAHYDRO-	152	C7H8O2N2	17394-56-4
18	024	071	BENZALDEHYDE, 2-HYDROXY-3-METHOXY-	152	C8H8O3	148-53-8
19	022	061	VANILLIN, PROPYL ETHER	194	C11H14O3	900395-32-2
20	020	071	VANILLIN, BUTYL ETHER	208	C12H16O3	900395-32-1





## RESULTS

Table No. 02: Major components.

Sr. No.	Name of the compound	Molecular Name	Molecular Weight	Activity
1	2-NORBORNYL BROMIDE	C7H11Br	174	Antimicrobial <sup>[9]</sup>
2	2-FUROYLACETO NITRILE	C7H5O2N	135	Anti-Inflammatory <sup>[10]</sup>
3	2-FURYL HYDROXYMETHYL	C6H6O3	126	Antioxidant And Anti-Inflammatory <sup>[11]</sup>
4	METHYL FUROATE	C6H6O3	126	Antimicrobial <sup>[12]</sup>
5	2-FURANCARBOXYIC ACID	C5H6O2N2	126	Antioxidant <sup>[13]</sup>
6	PYRIMIDINAME	C4H6N3	95	Antiviral <sup>[14]</sup>
7	HEPTANRDAMIDE, N,N-DL-BENZOLOXY	C21H22O6N2	398	Anti- Inflammatory <sup>[15]</sup>
8	CYCLOBUTANE-1,1-DICARBOXAMIDE	C20H18O6N2	382	Antimicrobial, Antifungal, And Antitumor <sup>[16]</sup>
9	3H-PYRAZOL-3-ONE, 2,4-DIHYDRO-4,4,5-TRIMETHYL	C6H10ON2	126	Anti-Inflammatory, Analgesic, Antiviral, Antibacterial, Or Antifungal. <sup>[17]</sup>
10	VANILLIN	C8H8O3	152	Antioxidant, Ant Sickling,

				Antimicrobial, Anti-Inflammatory <sup>[18]</sup>
11	TARTARIC ACID	C <sub>20</sub> H <sub>18</sub> O <sub>8</sub>	386	Anti-Inflammatory and Antioxidant <sup>[19]</sup>
12	OXIRANE	C <sub>8</sub> H <sub>8</sub> O	120	Bactericidal, Fungicidal, and Sporocidal Disinfectant <sup>[20]</sup>

## DISCUSSION

During pregnancy, the most notable anatomical change in the urinary tract is the dilation of the pelvicalyceal system and ureters, predominantly on the right side. These changes occur early in the first trimester and progress, with over 90% of women experiencing dilation by the third trimester. This dilation persists for about three months after childbirth. Consequently, pregnant women are more prone to asymptomatic bacteriuria and pyelonephritis due to impaired urine drainage and increased urinary stasis. Additionally, the dilated urinary tract creates a significant 'dead space' when measuring timed urine volumes.<sup>[21]</sup>

Darvyam Urocare syrup, a blend of *Daruharidra* and *Amalaki* with honey, is considered safe for use during pregnancy. While antibiotics are the primary treatment for UTIs, their use during pregnancy may pose risks and contribute to antibiotic resistance. Herbal formulations like Darvyam Urocare Syrup offer a safer alternative for managing UTIs during pregnancy. This syrup, designed to be more palatable, is particularly beneficial for pregnant individuals who may experience taste changes and nausea. The syrup's sugar content acts as a natural preservative, ensuring stability and potency of the herbal constituents over time. Its blackish-brown color allows for easy detection of rancidity and turbidity. Additionally, the addition of vanilla essence enhances its odor for better palatability.

Gas chromatography coupled with mass spectrometry (GC-MS) is a widely used analytical technique for the identification and separation of complex mixtures of compounds. In pharmaceutical analysis, it is particularly valuable for elucidating the composition of drugs and detecting their constituents.

In the case of Darvyam Urocare Syrup, GC analysis revealed three retention time (RT) values: 42.306%, 53.225%, and 2.243%, collectively covering 100% of the area. These peaks represent different compounds present in the syrup. Subsequent mass spectroscopy (MS) analysis of these peaks allowed for the identification of 20 chemical compounds within each peak. This comprehensive analysis provides valuable information about the composition of the syrup. One compound identified in the GC-MS analysis is 2-furyl hydroxymethyl, which was detected at retention times (RT) of 10.917 and 11.827. Interestingly, this compound appeared 8 and 4 times, respectively, at each RT, suggesting its abundance in the syrup. Moreover, 2-furyl hydroxymethyl exhibits antioxidant and anti-

inflammatory properties, making it potentially beneficial in the context of therapeutic applications.

Another compound detected in the analysis is vanillin, which was identified at RT 14.863 (6 times). Vanillin is known for its antioxidant, anti-sickling, antimicrobial, and anti-inflammatory activities. These properties highlight its potential pharmacological benefits, particularly in combating oxidative stress, microbial infections, and inflammatory conditions. Conversely, compounds detected at RT 12.672 were found not to possess pharmacological properties related to inflammation.

The combination of antioxidants, anti-inflammatories, and antibacterial action offers a comprehensive approach to managing UTIs. Antioxidants help reduce oxidative stress and support the immune response, anti-inflammatories alleviate symptoms by reducing inflammation, and antibiotics directly target and eliminate the bacteria causing the infection. This suggests that while they may contribute to the overall composition of the syrup, they may not have specific therapeutic effects against inflammation.

Overall, the GC-MS analysis of Darvyam Urocare Syrup provides valuable insights into its chemical composition and potential pharmacological properties, particularly in terms of antioxidant and anti-inflammatory activities.

## CONCLUSION

The latest research findings shed light on the composition of Darvyam Urocare Syrup, indicating that it contains a variety of volatile compounds. These compounds exhibit several beneficial properties, including anti-inflammatory, antioxidant, anti-sickling, antimicrobial, bactericidal, fungicidal, and sporocidal disinfectant effects.

Furthermore, a detailed analysis of the syrup's constituents reveals a wide array of bioactive compounds. These components are believed to be responsible for the therapeutic effects associated with Darvyam Urocare Syrup. In essence, this comprehensive examination provides valuable insights into the diverse range of potentially beneficial compounds present in the syrup, highlighting its potential as a therapeutic agent.

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