بسم الله الرحمن الرحيم

Sudan University of Science &Technology

College of Graduate Studies

Characterization of *Adansonia Digitata* Seeds Oil and its Antioxidant Activity on Sunflower and Ground nut Oils

توصيف زيت التبلدي و دراسة نشاطه المضاد للأكسده علي زيوت زهرة الشمس والفول السوداني

A Thesis Submitted in Fulfillment of the Requirements for the Degree of M.Sc. in Chemistry

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الإستهـــلال

قـــال تعـــالى :

﴿فَتَعَالَى اللَّهُ الْمَلِكُ الْحَقُّ ۗ وَلَا تَعْجَلْ بِالْقُرْآنِ مِن قَبْلِ أَن يُقْضَىٰ إِلَيْكَ وَحْيُهُ ۖ وَقُل رَّبِّ زِدْنِي عِلْمًا ﴿١١٤﴾﴾

سورة طه الآية(114)

صدق الله العظيم

DEDICATION

I dedicate my dissertation work to my family, a special feeling of gratitude to my loving parents, Magzoub and Khalida whose words of encouragement and push for tenacity ring in my ears, my husband Mohamed who always supported me throughout the process and never left my side.

I also dedicate this dissertation to my brothers Ahmed, Mohammed, Yaseen and Mohamed Khalid and to my sisters Maria and Malaz for helping me develop my skills and encourage me to do my best.

I dedicate this work and give special thanks to my wonderful kids Dan and Ahmed for being there for me, both of you have been my best cheerleads.

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Abstract

The present study was carried out to investigate the composition of *Adansonia digitata* seeds oil, and to test the ability of the oil to enrich the antioxidant property of other oils namely sunflower and ground nut oils. The proximate composition of *Adansonia digitata* seeds gave: oil content [21.84%], moisture content [4.69%], protein [19.90%], crude fiber [27.95%], ash [3.24%], crude lipid [0.65] and carbohydrate were found to be [21.73**%**]. The minerals content of the seeds in (ppm) was: Ca [1.38], Mg [4.94], Fe [0.226], Cu [0.013], Zn [0.014], Mn [0.017], Ni [0.13] and Na [347]. The physical properties are: density [0.6069g/cm^3], refractive index [1.469], viscosity [22.00cp] and the color [Golden yellow]. The physicochemical properties are: the acid value [1.3153mgKOH/g], saponification value [175.24 mg KOH/g], the unsaponified matter [12.12 g/kg], the peroxide value [2.30mEq O_2/kg], iodine value [84.58 I_2/100g] and ester value [173.93]. The GC-MS analysis of the oil revealed the presence of 26 components. Major constituents are: 9, 12 -octadecadienoic acid (Z, Z) methyl ester (27.60%); 9-octadecenoic acid (Z) methyl ester (22.81%); hexadecenoic acid methyl ester (21.03%) and methyl Stearate was (7.03%).

Though, the seed oil of *Adansonia digitata* is highly stable, its effect on the stability of sunflower and ground nut oils was week.

مستخلص البحث

أجريت الدراسه علي زيت بذور شجرة التبلدي و دراسة إمكانية إحتوائه علي مضادات أكسدة عبر إضافته لزيت الفول الخام وزيت بذرة الشمس.

تمت دراسة محتوي البذور علي :نسبة الزيت(21.84%)، نسبة الرطوبة(4.69%)، البروتين(19.90%)، الألياف(27.95%)، الرماد(3.24%)، الدهون(0.65%) و الكاربوهيدرات هي المكون الرئسي حيث كانت (21.72%). و تم تقدير محتوي بذور التبلدي للمعادن بتركيز(ppm) و كانت النتيجة كالآتي:Ca(1.38), Mg(4.94), Fe(0.226), Cu(0.013) و Zn(0.014), Mn (0.017), Ni(0.13),Na(347)

و الخواصه الفيزيائية و الفيزوكيميائية، حيث تضم الخواص الفيزيائية: الكثافة، معامل الإنكسار، اللزوجة و اللون و كانت النتيجة: ($g/cm^3$0.6069)، (1.469)، (22.0015cp) و (أصفر ذهبي) علي التوالي. و تضمنت الخواص الفيزوكيميائية: الرقم الحمضي(1.315 mg KOH/g)، قيمة التصبن(mg KOH/g175.24)، المواد غير المتصبنه(g/kg12.12)، قيمة البيروكسيد(m Eq O_2/kg2.30)، الرقم اليودي(I_2/100g84.58) والإستر(173.93). تم تحليل عينه من الزيت بإستخدام (GC-MS) و كانت النتيجة كالآتي:

9,12-octadecadienoic acid (Z,Z) methyl ester (27.60%); 9-octadecenoic acid (Z) methyl ester (22.81%); hexadecenoic acid methyl ester(21.03%) and Methyl Stearate (7.03%).

كان زيت بذور التبلدي ذو استقرارية عاليه، في حين كان أثره علي إستقرارية زيت بذرة الشمس و زيت الفول السوداني ضعيف.

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List of Abbreviations

Abbreviation	Name Figures
AOAC	The official methods of analysis of association of official analytical chemists
ISO	International Organization for Standardization
N	The Normality of the solution
IV	The Iodine Value
PV	The Peroxide Value
SV	The Saponification Value
GC-MS	Gas Chromatography-Mass Spectrometry

Chapter one

Introduction

1. Introduction

1.1General overview

"Tabaldi", "Gongoliz" or Baobab, Adansonia *digitata* L. (Malvaceae) is commonly known as Baobab tree native to Africa. *Adansonia digitata* (baobab) is a tree found in the savanna areas of Africa and Asia. In Sudan it is found in the western part of the country. The leaves are the major ingredient for a variety of food preparations. The pulp is also used for cold drinks, used as an appetizer for seasoning food or curdling milk, used as a coagulant of rubber, and as a fumigant for domestic animals (Nkafamiya, 2007).

The outer part of the bark is used for making packing materials and the spongy wood for making wide canoes (Chindo *et al.*, 2010).

Baobab oil is rich in sterols, tocopherols, fatty acids - omega 3, 6 and 9. It is anti-aging, anti-inflammatory, anti-oxidant and anti-radicals. It is used in cosmetics as anti-wrinkle/ageing, cell regeneration, improves skin elasticity, Skin disease treatment: eczema, rosacea and psoriasis, use in skin careproducts, Hair and scalp: protects and moisturises hair fibers, and adds shine to shampoo, body: acts as a base for essential oils and Stable against rancidity - long shelf life(Kupanda, 2015).

Adansonia digitata fruit pulp is usually expended in Africa by children, expectant mothers and senior citizens due to high content of vitamins and nutrients which help fight off diseases and afford admirable source of nourishment. In traditional medicine *Adansonia digitata* fruit pulp is used in the treatment of fevers, diarrhea and malaria. Due to its high vitamin C content, baobab fruit pulp has a well-documented antioxidant capacity (Donkor *et al.* 2014).

The problem is that there were many antioxidants used for oil preservation in the world generally and Sudan particularly, but there were a few systematic researches of using natural antioxidants especially in Sudan.

1.2 Vegetable oils

Vegetable oils, or vegetable fats, are fats extracted from seeds, or less often, from other parts of fruits. Like animal fats, vegetable fats are mixtures of triglycerides . Soybean oil, rapeseed oil, and cocoa butter are examples of fats from seeds. Olive oil, palm oil, and rice bran oil are example of fats from other parts of fruits. In common usage, vegetable oil may refer exclusively to vegetable fats which are liquid at room temperature (Wikipedia 2020).

Physico- chemical properties are an important factor that determines the overall quality and stability of a food system. It has been shown that for vegetable oils, density decreases linearly with temperature increasing, saponification value, iodine value, acid value, peroxide value is some of the important characteristics of a vegetable oil, physical properties of vegetable oils depend primarily on composition (and hence on biological origin) and temperature. The estimation of the physico-chemical properties of edible oils is essential in the design of unit processes such as distillation, heat exchangers, reactors and piping, on the other side.Macronutrients like proteins, carbohydrates and lipids and micronutrients like vitamins, minerals and antioxidants are the major components of a healthy daily diet. Edible oils are an important part of human diet, being used as food or as an ingredient in food products (Nita *et al*. 2013).

1.3 Oxidative reactions

The oxidative reaction is responsible for rancid odors and flavors within fats and oils which reduces nutritional quality of foods.

Oxidation reaction sconsist of auto-oxidation, photo oxidation, enzymatic oxidation and ketonic oxidation, where- as auto-oxidation is the most common deterioration during storage of edible oils. Auto-oxidation is the reaction between oxygen and unsaturated fatty acids via an auto-catalytic process consisting of a free radical chain mechanism. This chain includes initiation, propagation and termination reactions that could be cyclical once started (Taghvaei and Jafari, 2013).

1.4 Antioxidants

Antioxidants are components which prevent auto-oxidation of oils and fats by giving their hydrogen to free radicals formed in the initiation and propagation stages of auto-oxidation. During the past two decades, one of the most important requirements for a suitable antioxidant in oils and fats is the thermal stability during heat processing. It has been shown that most of natural additives have more antioxidants activity and thermal stability than synthetic ones in different edible oils. (Taghvaei and Jafari 2013).

1.5 *Adansonia digitata*

Adansonia digitata L. (Malvaceae), (appendix A) is commonly known as baobab tree native to Africa. Baobab is a multi-purpose tree which offers protection and provides food, clothing and medicine as well as raw material for many useful items. The fruit pulp, seeds, leaves, flowers, roots, and bark of baobab are edible and they have been studied by scientists for their useful properties. The fruit pulp have very high vitamin C, calcium, phosphorus, carbohydrates, fibers, potassium, proteins and lipids content, which can be used in seasoning as an appetizer and also make juices. Seeds

contain appreciable quantities of phosphorus, magnesium, zinc, sodium, iron, manganese, whereas they have high levels of lysine, thiamine, calcium and iron. Baobab has numerous biological properties including antimicrobial, anti-malarial, diarrhoea, anaemia, asthma, antiviral, anti-oxidant and anti-inflammatory activities amongst others. Phytochemical investigation revealed the presence of flavonoids, phytosterols, amino acids, fatty acids, vitamins and minerals (Rahul *et al.* 2015).

1.5.1 Traditional information

The various parts of the plant (leaves, bark and seeds) are used as a panacea, that is, to treat almost any disease and specific documented uses include the treatment of malaria, tuberculosis, fever, microbial infections, diarrhoea, anaemia, dysentery, toothache. The leaves and fruit pulp are used as febrifuge as well as an immune stimulant.In India it is reported that baobab pulp is used externally with buttermilk for the relief of diarrhea and dysentery, while the young leaves are crushed and used to treat painful swellings.In some countries in West Africa the leaves, fruit pulp and seeds are the main ingredients in sauces, porridges and bever-ages. Recently baobab has been referred to as a "superfruit" based on its nutritional profile (*e.g*. vitamin, fatty acid,mineral). The nutritional value of baobab is only briefly discussed since a comprehensive report on the nutritive aspects is already available. The major interest in baobab products is as a result of its ascorbic acnd dietary fiber content. The level of vitamin C contained in fruit pulp is high and can range from 2.8 to 3 g/kg.It was noted that baobab fruit pulp has very high vitamin C content (280–300 mg/100 g), which is seven to ten times more than oranges (51 mg/100 g). One study demonstrated that the consumption of 40 g of baobab pulp provided 100% of the recommended daily intake of vitamin C in pregnant women (19–30Years). The ascorbic acid content was evaluated in the fruit of

*Adansoniadigitata*and it was found to contain 337 mg/100 g of ascorbicacid, recommended that baobab leaves should be stored as whole leaves rather than ground leaf powder in order to preserve the high vitamin content(Rahul *et al.* 2015).

1.5.2 Natural distribution

In Sudan, *Adansonia digitata* are most frequently found in the southern part of the country. They thrive on sandy and rocky soils, from the short-grass savanna hto the deciduous savannah wood lands. They often occur as widely spaced individuals or small groups of individual's scat- tered over large areas. *Adansonia digitata* also common on mountain slopes such as the Jebel edDairin central Sudan sampled *Adansoni*a *digitata* up to an elevation of 1013 m in the Nuba Mountains. In the eastern foothills of the Jebel Marra massif, *Adansonia digitata* known to occur up to 1250 m. along wadi sandinde pressions, where water collects during the rainy season, *Adansonia digitata* found even in the very dry northern parts of Darfur and Kordofan with (100–200mm) annual rain fall on heavy soils, such as the flatclay plains around Habila (600 mm annual rainfall) in the Nuba Mountains, *Adansonia digitata* almost absent, mostly found as monumental individuals or in clumps on rocky outcrops that give this area characteristic feature. According to, *Adansonia digitata* form belts in Kordofan, Darfur, Blue Nile,Upper Nile(South Sudan)and Bahr ElGhazal (South Sudan) (Yahia *et al*. 2015).

1.6 Seed oil composition

Table (Error! No text of specified style in document.**.1) Proximate Composition of Seeds (%) by Shareef *et al*. (2014)**

Parameter	**% ± S.D**
Ash	5.95±0.19c
carbohydrate	70.45±1.82a
crude fiber	11.74±1.7b
Crude lipid	4.35±0.05c

Protein	7.51±1.171c

Table (Error! No text of specified style in document.**..2) physicochemical properties of A. digitata seed oil by Sulisu *et al.* (2015)**

Parameters	**Values**
Oil content (%)	32.0±0.00
Color	Light yellow
Moisture content (%)	1.08±0.50
Viscosity (cp)	33.72±1.17
Saponification Value (mg/KOH g^{-1})	158.62±0.07
Unsaponifiable Matter (g kg^{-1})	9.46±0.25
Iodine Value (mg g^{-1})	54.41±0.94
Acid Value (mg KOH g^{-1})	2.75±0.14
Peroxide Value (mEq kg^{-1})	6.02±0.48

1.7 Oil profile

Table (Error! No text of specified style in document.**..3) Fatty acids composition of the *Adansonia digitata* seeds oil, Shareef *et al.* (2014)**

Fatty acids	**Percentage ± SD**
Myristic acid ($C_{14:0}$)	1.01±0.07d
Palmatic acid ($C_{16:0}$)	29.57±1.03b
Palmitoleic acid($C_{16:1}$)	0.27±0.06d
Stearic acid($C_{18:0}$)	36.28±0.81a
Oleic acid($C_{18:1}$)	31.41±0.53b

Linoleic acid($C_{18:2}$)	27.31±0.16b
α-linolenic acid($C_{18:3}$)	6.65±0.42c
Arachidic acid($C_{20:0}$)	0.14±0.04d
Gadolic acid($C_{20:1}$)	0.20±0.02d
Unidentified	6.97±0.37c

1.8 Peanut oil

Peanut is one of the most important oil and protein producing crops in the world. Quality of peanut seed oil is influenced by temperature and moisture, Peanut is the fourth major oils seeds crop of the world next to soybean, rapeseed and cotton In (2015), peanut contributed 8.7% of the total oil seeds production (45 million ton) in the world, Peanut is an important oilseed crop for vegetable oil production, about(two-thirds) of total peanut production is crushed for oil and the remaining one-third is used in confectionery products in the world. Peanut seeds contain 9.5-19.0% carbohydrate on a dry seed basis it is a good source of mineral (P, Ca, Mg and K) and vitamins (E, K and B group). Peanuts are also a cheap source of protein, a good source of essential vitamins and minerals, and a component of many food products. Peanut contain 13 different fatty acids (palmitic, palmitolic, heptadecylic, heptadecenoic, stearic, oleic, linoleic, linolenic, arachidic, eicoseonic, behenich, nervonic and lignoceric). Oleic and linoleic acids are two important unsaturated fatty acids and both of them comprised about 80% of fatty acid composition. The rest of fatty acids are saturated fatty acids (20%), (Gulluoglu*etal*. 2016).

1.9 Sunflower oil

The sunflower (Helianthus annus L.) is a member of the compositae (Asteracea) family and the genus Helianthus. It originates from North America, where it was traditionally cultivated by the Native Americans.

The sunflower was introduced is into Spain in the middle of 16th century, where it was cultivated essentially as an ornamental plant. Its oil-bearing qualities were only discovered in the 18th century. Since that time, the sunflower for oil production has been considerable genetically improved. Some of the first improvements, through trait selection and hybridization, took place in Russia, then in U.S.A. and aimed at increasing the oil contents of the seeds. The breeding resulted in the development of strains with oleic improved acid content Soldertor, (1976). Recently, strains with low content saturated fatty acids have been developed (Abitogun *et al.* 2008).

1.10 Objectives

The objectives of this study are to investigate the following parameters of the bulb, seed composition and oil of the seed of *Adansonia digitata* through following study:

1- Proximate analysis of *Adansonia digitata* seeds. such as; oil content, protein content, ash content, fiber content, moisture content and carbohydrates content.
2- Physical properties of *Adansonia digitata* oil. The density, refractive index, viscosity and Color.
3- Chemical properties of *Adansonia digitata* oil. The acid value**,** Saponification, The unsaponified matter, Iodine value, Peroxide value and Ester value.
4- GC-MS analysis for *Adansonia digitata* oil (Oil profile).
5- Minerals in *Adansonia digitata* seeds.
6- Antioxidant property of *Adansonia digitata* oil.

Chapter Two

Materials and Methods

2. Materials and Methods

2.1 Materials

Retsch Gmb H Rheinische Type R 200 crusher (Germany), dedicator, oven, soxhlet extractor, electrical heater, muffle furnace, pycnometer, refract meter, the atomic absorption spectrophotometer instrument Model 210 VGP Cat# 28750-15 Cole-Partmer, India and GC-MS instrument (SHIMADZU QP-2010).

2.1.1 Plant Material

Adansonia digitata and ground nut seeds were obtained from the local market- Khartoum- Sudan, Sunflower oil obtained from Savola Company, Sudan.

2.2 Methods

2.2.1 Oil Extraction

The crude oil was extracted by screw mill, filtered and kept for further analysis.

2.2.2 Oil blending

Adansonia digitata was mixed with Sunflower and ground nut oils in different ratios ( ) [90%] ground nut and [10%] *Adansonia digitata* oil, ( ) was [85%] ground nut and [15%] *Adansonia digitata* oil ( )[80%] ground nut and [20%] *Adansonia digitata*. The ratios between sunflower oil and *Adansonia digitata* oil were the same as ground nut to *Adansonia digitata* oil: [90%: 10%], [85%:15%] and [80%:20%].

2.2.3 Proximate analysis

2.2.3.1 Moisture content

Moisture was determined according to method described by AOAC (1990) method. Three grams of well-mixed sample were weighed accurately in clean preheated dish of known weight by using sensitive balance. The uncovered sample and dish were kept in an oven provided with a fan at 105 ^{0}C and let to stay overnight. The dish was covered and transferred to dedicator and weighed after reaching room temperature. The dish was again heated in the oven for another two hours and reweighed. This was repeated until constant weight was obtained. The loss of weight was calculated as present of sample weight and expressed as moisture content

$$\text{Moisture content } \% = \frac{\text{W1} - \text{W2}}{\text{W1}} \times 100 \qquad \textbf{(}\text{Error! No text of specified style in document.}\textbf{-1)}$$

Where:

$W1 \equiv weight\ of\ sample\ before\ drying.$

$W2 \equiv weight\ of\ sample\ after\ drying.$

2.2.3.2 Oil content of *Adansonia digitata* seeds

Total fat was determined by AOAC (1990) method. Two grams of crushed seed sample were placed in extraction thimble and plugged by a piece of cotton, and then the thimble was placed in soxhlet extractor. A dry and accurately weighted flask was fitted to the extractor, then solvent (Normal Hexane) was poured in to the flask, and then extractor, flask and condenser was fitted together. Water was allowed to flow through the condenser. Heat was applied from an electrical heater. The system allowed to continuous evaporation and Siphoning. Extraction period was from 6-8 hours. After

extraction period the solvent was distilled off and the flask with oil was dried in oven for 30 min at 1000C, cooled in desiccator and weight.

The oil content was calculated according to the following equation:

$$\text{Oil content } \% = \frac{\text{W2} - \text{W1}}{\text{SW}} \times 100$$

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Where:

$W1 \equiv weight\ of\ empty\ flask.$

$W2 \equiv\ weight\ of\ flask\ with\ extracted\ oil\ (after\ solvent\ evaporation).$

$SW \equiv\ weight\ of\ sample.$

2.2.3.3 Crude protein:

Nitrogen content determinations were made on the sample by micro kjeldahl technique following AOAC (1990) method. 0.2 g of sample was weight accurately into a micro kjeldahl flask, 0.4 g of catalyst mixture (90% potassium sulphate and 10% cupric sulphate) and 3.5 ml of concentrated sulphuric acid were added, the flask was placed in the digestion equipment for 3 hours. Then the sample transferred to distillation flask; 20 ml of 40% NaOH were added to distillation apparatus. The system brought to distillation. The ammonia evolved was received in 10 ml of 2% Boric acid solution. The trapped ammonia is titrated against 0.02 N HCL using universal indicator (methy1 red + bromocresol green).

$$\%\ Nitrogen\ (N) = \frac{v\ \times N\ \times 14 \times 100}{sw \times 1000}$$

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$$\%\ Protein\ =\ [N\%] \times [6.25]$$

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Where:

$V \equiv Volume\ of\ HCL.$

$N \equiv HCl\ concentration.$

$\boldsymbol{Sw} \equiv \boldsymbol{Sample\ weight}.$

2.2.3.4 Crude fiber:

Crude fiber was measured using Pearson (1976) method. Three grams of defatted sample were placed in 1 litter conical flask. Twenty ml of H_2SO_4 (0.255 N) was added to the conical flask and placed on digestion apparatus with readjusted hot plate and boiled exactly for 30+2 min, it was rotated periodically to keep solids from adhering to sides, and water level was maintained in the flask by adding water. The conical flask removed and the content filtered through buchner funnel using filter paper. The conical flask rinsed with hot water several times and washed through buncher. The residue transferred to the conical flask and 200 mL of sodium hydroxide (0.313N) was added and allowed to boil for 30+2 min. Then conical flask removed and filtered as above with filter paper. The residue first washed with enough 1% HCL to make the paper and contents acid (use indicator paper at funnel tip), and then with hot water was added to remove acid. Then wash with alcohol and diethy1 ether until substantially all the water removed. The air dried residue transferred to ashing crucible and dried to constant weight in drying oven, cooled in desicator and weighed, then ignited at 500C in muffle furnace. Then the ashes sample cooled in desicator and reweighed. Then the fiber content calculated as follow:

$$\% \text{ Crude fiber } = \frac{W2 \times 100}{W1}$$ **(**Error! No text of specified style in document.**-5)**

Where:

$W2 \equiv Loss\ of\ weight\ on\ ignition.$

$\boldsymbol{W1 \equiv\ Weight\ of\ sample}.$

2.2.3.5 Ash content:

Total ash was determined according to AOAC (1990) method. Three grams of well mixed sample were weight in porcelain crucible of known weight. The crucible ignited at 550 0 ºC in a muffle furnace until light gray ash was obtained. The content of the crucible was cooled in desiccators and weight soon after it reached room temperature. Percentage of ash calculated from the increase in the weight of the crucible. Ash content was calculated using the following equation:

$$\text{Ash}\% \ = \ \frac{W1 - W2}{S} \times 100$$ **(**Error! No text of specified style in document.**-6)**

Where:

$W1 \equiv weight\ of\ ash\ +\ porcelain\ crucible$

$W2 \equiv\ weight\ of\ empty\ porcelain\ crucible$

$\boldsymbol{S \equiv\ weight\ of\ sample}$

2.2.3.6 Carbohydrate content

Carbohydrate was found by calculation:

$$\text{Carbohydrate \%} = 100 - (\text{Ash\%} + \text{Moisture \%} + \text{Protein} + \text{Fiber \%} + \text{Fats \%})$$ **(**Error! No text of specified style in document.**-7)**

2.2.4 Physical properties of *Adansonia digitata* oil

2.2.4.1 Density

The density: the weight of a small empty vial was weighed and was filled with 5g of oil up to the brim. The vial was weighed again and the density was calculated as Diamante and Lan (2014).

$$\text{Density} = \frac{[\text{Weight of vial} + \text{oil (g)}] - [\text{Weight of empty vial (g)}]}{\text{Volume of oil}}$$ **(**Error! No text of specified style in document.**-8)**

2.2.4.2 Refractive index

The refractive index of the oil was determined by Diamante and Lan (2014). The refract meter was first adjusted at 1.3330 at 200 C with pure distilled water as a blank reading. A drop of the fixed oil was placed in the instrument and telescope was adjusted so that the cross hairs were distinct and in focus. The adjustment of the knob was rotated until the lower part of the field was dark and the upper part was light and a clear definite boundary appeared. The coarse adjustment knob was moved first and then the fine adjustment knob until the boundary line coincided with the intersection of the cross hair in the telescope. The instrument was read when temperature is stable.

2.2.4.3 Determination of color

Color was determined according to ISI Hand book of Food Analysis (1984). The sample liquid and filtered through a filter paper to remove any impurities and traces of moisture till is sure that the sample was absolutely clear and free from turbidity. The glass cell of desired size cleaned with carbon tetrachloride and allowed to dry. The cell filled with the oil and placed in position in the in to meter. The color matched with sliding red and yellow colors.

2.2.4.4 Viscosity

Viscosity was determined according to Diamante and Lan (2014). 20mL of the oil sample poured into a capillary of a calibrated viscometer at a closely controlled and known temperature and the time for the volume of the oil to flow under gravity through a calibrated glass capillary tube was noted and recorded. The viscosity was obtained by multiplying the time of flow obtained and the factor on the glass calibrated viscometer (ASTMD445).

2.2.5 Physicochemical properties of *Adansonia digitata* oil

2.2.5.1 Acid value:

25ml of diethyl ether and 25mL of ethanol were mixed in a 250 ML beaker. The resulting mixture was added to 20g of oil in a 250 mL conical flask and few drops of phenolphthalein indicator were added. The mixture was titrated with 0.1NKaOH solution from the burette to the end point with consistent shaking until a dark pink color was observed and the volume of 0.1NKaOHwas noted. (Pearson 1976).

Calculation:

$$\text{Acid value} = \frac{56.1 \times \text{V} \times \text{N}}{\text{W}}$$

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style in document.**-9)**

Where:

$V \equiv Volume\ in\ ml\ of\ standard\ potassium\ hydroxide.$

$N \equiv Normality\ of\ the\ potassium\ hydroxide\ solution.$

$W \equiv Weight\ in\ g\ of\ the\ sample$

2.2.5.2 Saponification value:

Saponification value was determined according to ISO 3657: 2002. 2.0g of sample were transferred into a 200mL conical flask, 25 ml of alcoholic KOH solution were added to the flask, The flask gently heated and occasionally shaked while adjusting the heat so that Back flow ethanol will not reach the top of cooling pipe. After heated for one hour, immediately cooled, and titrated with 0.5mol / L HCl before the test liquid is solidified. Blank test performed for 3 times to obtain mean value of titration volume of 0.5mol/L hydrochloric acid.

The saponification was calculated as followed:

$$SV = \frac{(W2 - W1) \times 28.05}{S}$$

(Error! No text of specified style in document.**-10)**

Where:

$W2 \equiv Volume\ of\ titrated\ 0.05\ N\ (KOH)\ with\ sample$

$W1 \equiv Volume\ of\ titrated\ 0.05\ N\ (KOH)\ with\ blank$

$S \equiv Sample\ size\ (g)$

2.2.5.3 Unsaponifiable matter

Unsaponifiable matter was determined according to ISO 3596: 2000. Accurately 2.0 g of well mixed oil weighed in to a 250mL conical flask.

Add 25mL of alcoholic potassium hydroxide solution. The content Boiled under reflux air condenser for one hour until the Saponification is complete (complete Saponification gives a homogeneous and transparent medium). Take care to avoid loss of ethyl alcohol during the saponification. The condenser washed with about 10 mL of ethyl alcohol. The saponified mixture was transferred while still warm to a separating funnel. The saponification flask washed first with some ethyl alcohol and then with cold water, using a total of 50 mL of water to rinse the flask. Cool to 20 to 25ºC. Fifty ml of petroleum ether were added to the flask, shaked vigorously, and allowed the layers to separate. The lower soap layer transferred in to another separating funnel and repeats the ether extraction for another 3 times using 50 mL portions of petroleum ether. The combined ether extract was washed three times with 25 mL portions of aqueous alcohol followed by washing with 25 mL portions of distilled water to ensure ether extract is free of alkali (washing are no longer alkaline to phenolpthalen), the solution transferred to 250 mL beaker, rinse separator with ether, added rinsings to main solution, evaporated for about 5mL and transferred quantitatively using several portions.

$$WE = 0.282\ V \times T$$

(Error! No text of specified style in document.**-11)**

Where:

WE ≡ Weight of FFA in the extract

T ≡ Titration of standard (mL)

V ≡ Volume of titrated 0.05 N (KOH) with blank.

$$unsaponified\ matter = \frac{[(\mathrm{WR}) - (\mathrm{WE})] \times 100}{\mathrm{WS}}$$

(Error! No text of specified style in document.**-12)**

Where:

WE ≡ Weight of free fatty acids in the extract

WR ≡ Weight of the residue

WS ≡ Weight of sample

2.2.5.4 Peroxide value

Peroxide value was determined according to ISO 3960: 2007.2g of the samples was delivered into a conical flask. 25 mL of solvent were added (15mL of glacial acetic acid + 10mL of chloroform) and gently shake to dissolve the sample completely. 1mL of saturated potassium iodide wasadded and immediately seals the flask and gently shake it for one minute. The flask left at room temperature in a dark. 30mL of pure water were added, Titration with 0.01mol/L sodium thiosulfate was performed to measure peroxide value. Likewise, perform blank test to obtain blank level. The peroxide value was measured as followed:

$$\mathrm{PV} = \frac{[v] \times [M] \times 1000}{w}$$

(**Error! No text of specified style in document.**-13)

Where:

$V \equiv \ Titration\ of\ sodium\ thiosulfate\ \ (mL)$

$M \equiv \ Molarity\ of\ sodium\ thiosulfate\ \ (M)$

$\boldsymbol{W \equiv Weight\ of\ sample\ (g)}$

2.2.5.5 Iodine value

(0.3) g of oil was weighed and placed into a 25mL conical flask. 10 cm^3 of carbon tetrachloride was added to this and similar flask containing no oil was set-up to serve as the blank. To both flask 25 cm^3 of Wiji's reagent were added from a burette. The solutions were mixed well and left in dark for an hour. After that, 15cm^3 of 10% KI, solution and 100cm^3 of distilled water were added to both flasks and titrated with standard 0.1M Na solution using starch as the indicator. The end-point was taken when the solution turned just colorless. While titrating the solution, the carbon tetrachloride layer was transferred to the aqueous layer to (ISO 3961:1996).

$$\mathrm{IV} = \frac{[\mathrm{VB} - \mathrm{VS}\,] \times [\,\mathrm{M}] \times [12.69]}{\mathrm{W}}$$

(Error! No text of specified style in document.**-14)**

Where:

$VB \equiv \ Titration\ of\ blank\ .$

$VS \equiv \ Titration\ of\ sample\ (mL).$

$M \equiv Molarity\ of\ standard.$

$W \equiv Weight\ of\ sample\ (g)\ .$

2.2.6 Minerals and heavy metals determination

2.2.6.1 Preparation of the ash

Three grams of well mixed sample were weight in porcelain crucible of known weight. The crucible ignited at 550 0C in a muffle furnace until light gray ash was obtained AOAC (1990).

2.2.6.2 Preparation of ash solution for mineral identification

Ten mL of HC (10% conc.) was added to the ash, the content brought to water path for one hour, and the sample filtered with filter paper and the content transferred to 50 mL vlometric flask, the volume completed to 50 ml using distilled water.

2.2.6.3 Determination of minerals by Atomic absorption

The atomic absorption spectrophotometer instrument Model 210 VGP Cat# 28750-15 Cole-Partmer, India was used in this study. Instrument conditions such as pressure of fuel, oxidant and others were adjusted according to the Atomic Absorption Spectrophotometer. Instrument was calibrated by blank solution and finally analyzed metals content in fruits juice. And data were recorded.

2.2.7 GC-MS analysis

2.2.7.1 Oil Esterification

The oil sample (0.15 - 0.17 g) was taken in a test tube and 10 mL of n-heptane was added and then vortexed. Thereafter 4 mL of 3.5% methanolic KOH was added and vortexed again for 2 min. This solution was put in a water bath maintained at 70ºC for 2 min. Thereafter the solution was vortexed 5 more times and the upper layer is drawn out in to a beaker and is evaporated till dried. Then 0.5 mL of n-heptane was added to the residue

and mixed well. This constituted the fatty acid methyl esters extract for GC-MS analysis.

2.2.7.2 Fatty Acid Content (FAC)

Relative concentration of fatty acid (FA) from oil samples was measured as their corresponding methyl esters. One µl of the extract prepared as above was injected in GC-MS instrument (SHIMADZU QP-2010).Oil composition was analyzed.

2.2.7.3 Schaal method

Schaal oven storage stability test (Tests for determining oxidative stability), Accelerated storage-testing of fats, oils and fat-containing foods.

The oxidation and the antioxidant of baobab oil were determined according to Schaal Oven Storage Stability Test (Tests for determining oxidative stability) described by Eastman (2010) as the following:

Thermostatically controlled gravity convection oven capable of maintaining temperature range of (6 2.8°C to 6 1.2°C) (145.04 °F to 142.16 °F).

Glass jars (4-oz, wide mouth, with screw caps) Procedure

The oven set for desired storage temperature.

Label a sufficient number of the jars with proper identification, control (no antioxidant) samples must be included in this test. Code the samples to eliminate any bias on the part of the organoleptic panel members. (Caution: Make certain that the labels used will adhere to the jars and remain legible during extended storage at elevated temperatures).

Laboratory note book the sample identification and the date of the beginning of the storage test were recorded.

The labeled jars filled one-third to one-half full with the desired test samples and cap the jars.

The jars placed in the oven in a manner to allowed free circulation of the heated air in the closed oven.

The Peroxide value samples at appropriate intervals were evaluated, the length of the interval between evaluations will depend on the nature of the individual sample. However, samples having relatively short Schaal oven life (1 week or less) should be evaluated at 24-hour intervals, while samples having longer oven life may be evaluated twice a week. A sample is removed from the oven when a rancid has been detected by a majority of the Peroxide value (max 10 for refined oils and 15 for crude oils).

The laboratory note book was recorded the date each sample is removed from the oven.

Each sample calculated and the average days to rancidity (by determined the Peroxide value) when all the replicates have been removed from the oven, Results as “Storage Stability, as Days to Develop Rancid were recorded”,(Eastman2010).

Chapter three

Results and discussion

3. Results and Discussion

3.1.1 proximate analyses

The proximate analyses were carried out in triplicates and the results obtained were the average values and illustrated in **Table (3.1).**

Table (Error! No text of specified style in document.**..15): The proximate analysis of *Adansonia digitata* seeds as % (w\w)**

Oil content %	**Moisture %**	**Lipid %**	**Protein** %	**Fiber** %	**Ash %**	**Carbohydrate %**
21.84	4.69	0.65	19.9	27.95	3.24	43.57

The oil content of the seeds was found to be (21.84%). This value is high, indicating that it may be a promising source of oil. The results was greater than Shareef *et al.* (2014) who found crude oil yielded (4.35±0.05%), the moisture content of the seeds obtained by Sulisu *et al*. (2015) was (4.41±0.25 %) which is closed to this study (4.96%), The moisture content of the oil is very low and backs up the fact that storage for a long period of time will not give rise to spoilage due to microbial growth. protein content was (19.90%) that was more than Shareef *et al.* (2014) who obtained the value (7.51%), fiber content was (3.24 %) it was less than that mentioned by Shareef *et al.* (2014) (11.74%).Carbohydrate content was found to be (21.73%) that was closer to some extent to the value obtained by Sulisu *et al.* (2015) (25.91%). While fat content was the lowest quantity (0.65%), this result was less than that obtained by Shareef *et al.* (2014) (4.35%). Ash content was (3.24%) which was less than Shareef *et al.* (2014) (5.95%). The high ash contents indicate that significant amount of minerals may be present.

3.1.2 Minerals of *Adansonia digitata* pulp

(**Table3.2**) shows the presence of calcium (Ca), magnesium (Mg), sodium (Na), iron (Fe), copper (Cu), zinc (Zn), manganese (Mn) and nickel (Ni) in the seeds sample.

Table (Error! No text of specified style in document.**..16): Minerals of Adansonia digitata pulp**

Minerals	**Ca**	**Mg**	**Na**	**Fe**	**Cu**	**Zn**	**Mn**	**Ni**
Concentration (ppm)	1.38	4.94	347	0.226	0.013	0.0141	0.017	0.13

Ca was found to be (1.38ppm), this result was less than that obtained by Shareef *et al.* (2014) (2.61ppm). Mg was (4.94ppm), this result was greater than that obtained by Shareef *et al.* (2014) (2.17ppm). Fe was (0.226ppm), this result was less than that obtained by Shareef *et al.* (2014) (0.634 ppm). Cu was the lowest concentration (0.013ppm), this result was less than that obtained by Shareef *et al.* (2014) (0.105ppm). Zn was (0.014 ppm),this result was close to Shareef*et al.* (2014) (0.016 ppm). Mn (0.017ppm),this results was less than Shareef*et al.* (2014) who obtained the value (0.41 ppm), Ni was (0.13 ppm) This results was less than Shareef *et al.* (2014) who found the value, Na was the highest (347ppm) This results was less than Shareef *et al.* (2014) (1.76ppm). These results revealed that *Adansonia digitata* may provide a sufficient amount of minerals to meet the human mineral requirement. Also variation of results from other researchers may be attributed to different location and different soil content.

3.1.3 Physical properties of *Adansonia digitata* oil

Table (3.3) showed physical properties of *Adansonia digitata* oil. Physical properties of vegetable oils is dependent on their fatty acid composition, minor components and temperature,

Table (Error! No text of specified style in document.**..17) Physical properties of *Adansonia digitata* oil**

Specific density g/cm3	Viscosity cp	Refractive index	Color
0.6069	22.0015	1.469	Golden yellow

Density of *Adansonia digitata* oil was found to be (0.6069 g/cm3). This result was lower than Kupanda (2015) who postulated that density of *Adansonia digitata* oil at 20 °C was (0.930 g/cm3).The refractive index of *Adansonia digitata* oil was found to be (1.469). This result was in the range mentioned by Kupanda (2015) (1.466 - 1.480) at 20 °C. The Viscosity of *Adansonia digitata* oil was found to be (22.0015cp). This result was less than Sulisu*et al.* (2015)

(33.72±1.17cp).The color was found to be (Golden yellow), the same color that mentioned by Kupanda (2015).

3.1.4 Physicochemical properties of the oil

The quality of the oil from the seeds of *Adansonia digitata* was assessed using parameters such as Acid value, Saponification value, Unsaponifiable matter, Peroxide value, Iodine value and Ester value.

Table (Error! No text of specified style in document.**.4): Physicochemical properties of *Adansonia digitata* oil**

Acid value Mg KOH/g	Saponification value mg KOH/g	Unsaponifiable matter g/kg	Peroxide value m eq O2/kg	Iodine value g I_2/100g	Ester value
1.315	175.24	12.12	2.301	84.5755	173.925

The Physicochemical properties of *Adansonia digitata* oil were illustrated in **Table (3.4)**.Acid values are used to measure the extent to which glycosides in the oil has been decomposed by lipase and other physical factors such as light and heat, Sulisu *et al*. (2015). The low acid value of *Adansonia digitata* oil **Table (3.4)** (1.315mgKOH/g) suggests that the oil is less susceptible to lipase action. This result was less than what was mentioned by Kupanda (2015) (2.5 mg KOH/g). Moreover, it was in the range recommended for cooking oil which is (0.00-3.00 mg KOH/g) Sulisu *et al.* (2015).The Saponification of *Adansonia digitata* oil (Table-4) was found to be (175.24 mg KOH/g). The result was in the range mentioned by Kupanda (2015) (170.0 – 200.0 mg KOH/g).The saponification value falls within the range of that of shea butter oil (175.30±0.81mgKOH/g) which could be good for soap making Abdullahi*et al.* (2016). This indicates that the oil could also be used in soap making since its saponification value falls within the range of this oil. The term "Unsaponifiable Matter" in oils or fats, refers to those substances that are not saponifiable by alkali hydroxides but are soluble in the ordinary fat solvents, and to products of saponification that are soluble in such solvents. The unsaponifiable value of *Adansonia digitata* oil **Table (3.4)** was found to be (12.12 g/kg). This result was more than Sulisu *et al.* (2015) who obtained the value (9.46 ± 0.25

g/kg). The peroxide assay is a predominant test for oxidative rancidity in oils and fats. This is a measure of concentration of peroxides and hydro peroxides formed in the initial stage of lipid oxidation. Peroxide value is also used as a measure of the extent to which rancidity reactions have occurred during storage. A high peroxide value for any oil shows the fact that the oil has less resistance to lipolytic hydrolysis and oxidation while a low peroxide value shows otherwise Sulisu *et al.* (2015). The peroxide value of *Adansonia digitata* oil **Table (3.4)** was found to be (2.301 m eq O_2/kg).This result was less than what recommended by Kupanda (2015) who obtained the max value as (10 m eq O_2/kg). It's quite low and indicates less susceptibility to oxidation.

The iodine value is a measure of the degree of unsaturation of the fatty acids in on oil and could be used to quantify the amount of double bonds present in the oil which reflects the susceptibility of oil to oxidation Sulisu *et al.* (2015). The iodine value of the oil **Table (3.4)** was found to be (84.58 g I_2/100g). This reflects the presence of low percentage of unsaturated fatty acids in the seeds oil, the result was in the range recommended by Kupanda (2015) (65 - 95 g I_2/100g).

Ester value of *Adansonia digitata* oil **Table (3.4)** was found to be (173.92), (saponification value- acid value).

3.1.5 Constituents of the oil

Table (Error! No text of specified style in document.**.5): Constituents of *Adansonia digitata* oil by GC – MS**

The functional properties of commercial oils are closely related to their fatty acid composition. The fatty acid composition of the oil improved the understanding of the oil quality.

Table (3.5) showed the fatty acid composition of *Adansonia digitata* seeds oil.

Peak	Retention time	Area %	Name
1	14.029	0.36	Methyl tetradecanoate
2	14.855	0.02	6-Octadecenoic acid, methyl ester
3	14.958	0.02	5-Octadecenoic acid, methyl ester
4	15.117	0.08	Pentadecenoic acid, methyl ester
5	15.853	0.03	7,10-Hexdecadienoic acid, methyl ester
6	15.915	0.08	Methyl hexadec-9-enate
7	15.956	0.25	9-Hexadecenoic acid, metyl ester, (Z)-
8	16.189	21.03	Hexadecenoic acid, metyl ester
9	16.807	0.06	Hexadecenoic acid, ethyl ester
10	16.855	0.49	Methyl 9,12-heptadecadienoate
11	16.905	0.53	Cis-10-Heptadecenoic acid, methyl ester
12	17.125	0.42	Heptadecenoic acid, methyl ester
13	17.591	6.88	Methyl 2-octyleyelopropene-1-heptanoate
14	17.861	27.60	9,12-Octadecadienoic acid (Z,Z)-, methyl
15	17.919	22.81	9-Octadecenoic acid (Z)-, methyl
16	18.079	7.03	Methyl Stearate
17	18.498	3.48	Methyl 2-octyleyelopropene-1-octanoate
18	18.851	4.75	Cyclopropaneoetanoic acid, 2-octyl-, meth
19	19.627	0.72	Cyclopropanecosanoic acid, methyl ester
20	19.821	1.88	11-Eicosenoic acid, methyl ester
21	20.647	0.04	Heneicosanoic acid, methyl ester
22	21.442	0.70	Docosanoic acid, methyl ester
23	22.206	0.15	Tricosanoic acid, methyl ester

Palmatic acid is the most common saturated fatty acid which was present as hexadecenoic acid, methyl ester and hexadecenoic acid, ethyl ester was (21.14%) and that was less than what was illustrated by Shareef *et al.*

(2014) (29.57%) but it was in the range recommended by Kupanda (2015): (18 -30%).

Linoleic acid is a polyunsaturated omega-6 fatty acid and one of two essential fatty acids for humans, linoleic acid was found as 9,12-octadecadienoic acid (Z,Z), it was (27.60%) in (Table-5),which was to be the same with Shareef *et al.* (2014) (27.31%), but it was in the range recommended by Kupanda (2015) (25 – 45%).

Oleic acid was found as 9-octadecenoic acid (Z) is classified as a monounsaturated omega-9 fatty acid (Bailey. 1929); Oleic acid was (22.81%), which was less than Shareef *et al.* (2014) (31.41%). In contrast it was less than what obtained by Kupanda (2015) (30 - 45%).

Methyl Stearate is one of the saturated methyl esters, it was found to be (7.03%),this result was more than sunflower which contain (4.68%) from methyl Stearate obtained by Pinto *et al.* (2017).

3.1.6 Antioxidant activity of *Adansonia digitata* oil

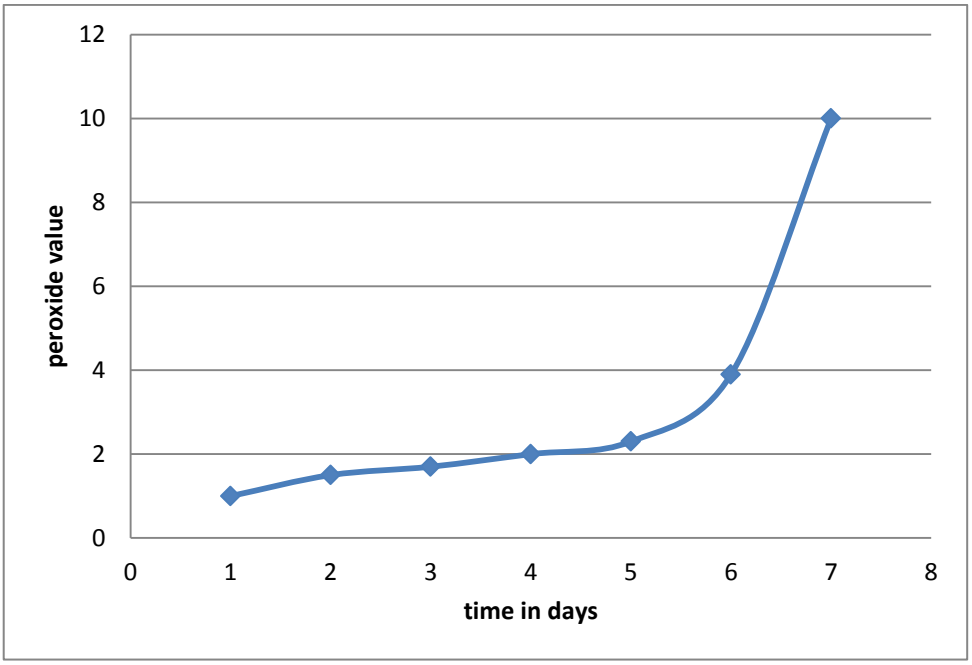

Figure Error! No text of specified style in document.**.1 Antioxidant properties of *Adansonia digitata* oil**

Figure (3.1) reflects the antioxidant properties of *Adansonia digitata* oil. The oil was very stable in the first days up to day 5 (as the peroxide value was increasing very slowly and at day 7 the peroxide was value increased steadily. This may be due to presence of antioxidant in the oil, which agreed with Vertuani *et al.* (2002) who postulated that lipid-soluble antioxidant capacity of *Adansonia digitata* fruit pulp causing antioxidant effect.

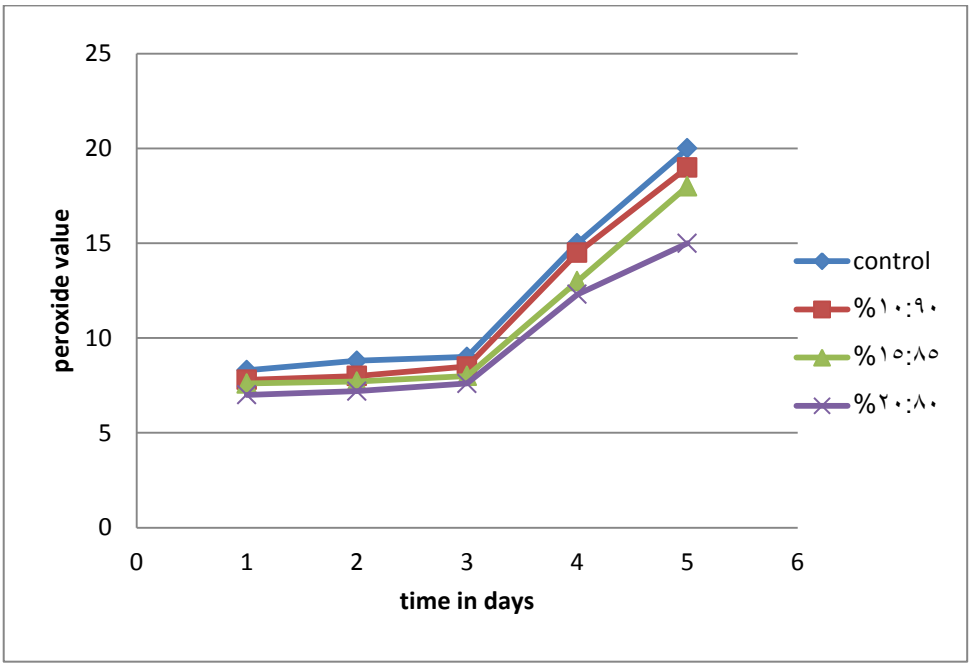

Figure Error! No text of specified style in document.**.2 Antioxidant properties of *Adansonia digitata* oil on ground nut**

Figure (3.2) show Antioxidant properties of *Adansonia digitata* oil on groundnut: All the treatments were undergoing the same curve behavior, but they differ in values; so that the oil stability in the first days peroxide value slowly increased; and at days 6 to 7 the peroxide was increased steadily; the ground nut alone showed high peroxide value during all days and yielded the highest peroxide value at day 7. As the percentage of *Adansonia digitata* increased in the mixture the peroxide decline; so that 20% added from *Adansonia digitata* oil the peroxide declined to 15 at the end of the 7 day **(Fig.3.2)**, this results indicate that *Adansonia digitata* oil have an antioxidant effect due to presence of antioxidant materials in the oil that lead to longer the shelf life of the oil. This agreed with Vertuani *et al.* (2002) who postulated that lipid-soluble antioxidant capacity *Adansonia digitata* fruit pulp causing antioxidant effect.

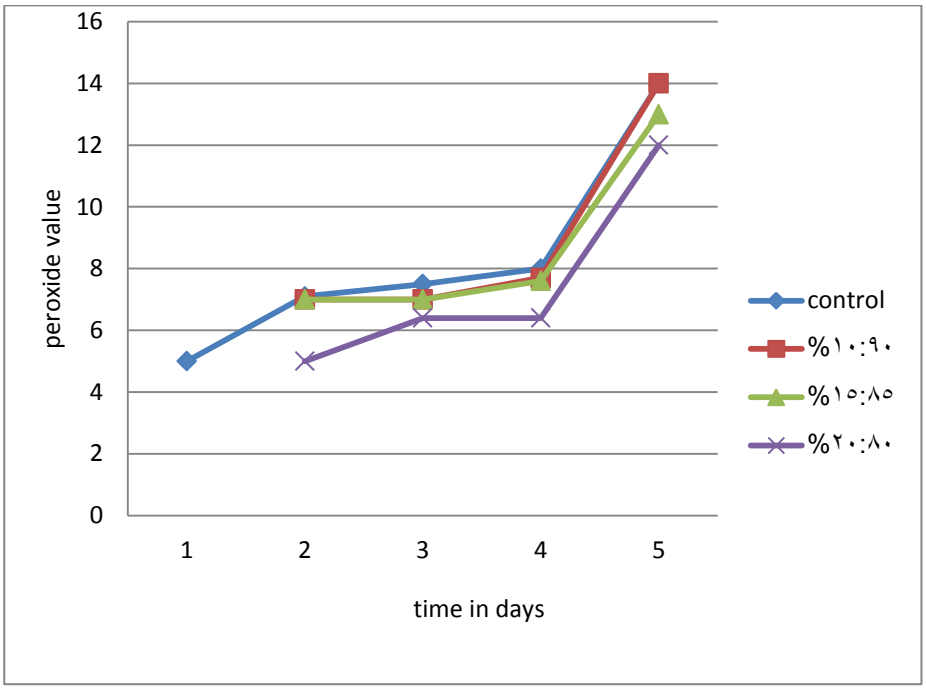

Figure Error! No text of specified style in document.**.3 Antioxidant properties of *Adansonia digitata* oil in Sunflower**

Figure (3.3) Antioxidant properties of *Adansonia digitata* oil in Sunflower: All the treatments were undergoing the same curve behavior, and the values of addition of 10% *Adansonia digitata* oil showed no great differences, but addition of 15% and 20% reduced the peroxide value to some extent for both oils and the peroxide value increased slowly during the first 3 days but increased steadily afterwards **Figure (3.3)**.

These results explained that *Adansonia digitata* oil prolong the rancidity of the oil due presence of antioxidant materials; which agreed with Vertuani *et al.* (2002) who postulated that lipid-soluble antioxidant capacity of *Adansonia digitata* fruit pulp causing antioxidant effect. Also agreed with Donkor *et al*. (2014) who reported that the application of extracted oil from *Adansonia digitata* seeds enhanced antioxidant enrichment by protecting and stabilizing the ascorbic acid to withstand higher temperatures, and view of the high antioxidant capacity. The seed oil may be a new valuable

ingredient for food preparation and nutraceutical application in the promotion of health (Kupanda, 2015).

3.2 Conclusion

The study concludes that:

- *Adansonia digitata* oil is highly stable.
- *Adansonia digitata* oil is weak antioxidant agent.
- According to the high value of the sabonification *Adansonia digitata* Seeds oil good for making soap.
- The oil is edible.

3.3 Recommendations

Antioxidant capacity of adansonia digitata seed oil can be determined using another method for examble DPPH (2,2-diphenyl-1-pycrylhyrazyl)to compare with the reported results.

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Appendices

Appendix A

Adansonia digitata scientific classification:

بسم الله الرحمن الرحيم

The Republic of Sudan
Ministry of Higher Education and Scientific Research
National Centre for Research
Medicinal & Aromatic Plants & Traditional Medicine Research Institute

جمهورية السودان
وزارة التعليم العالي والبحث العلمي
المركز القومي للبحوث
معهد أبحاث النباتات الطبية والعطرية والطب الشعبي

Date :8.3.2017

To whom it may concern

This to certify that the plants materials were taxonomically authenticated by Maha Omar Sagadei at herbarium of Medicinal and Aromatic Plants &Traditional Medicine Research institute (MAPTMRI), National center for Research, Khartoum, Sudan, and voucher herbarium samples were deposited there for further future reference.

Botanical name: *Adansonia digitata*L.

Family : Bombaceae

Vern Name: Tabaldi

Name: Marwa Magzoub Saeed Mohamed

Sudan University science of technology

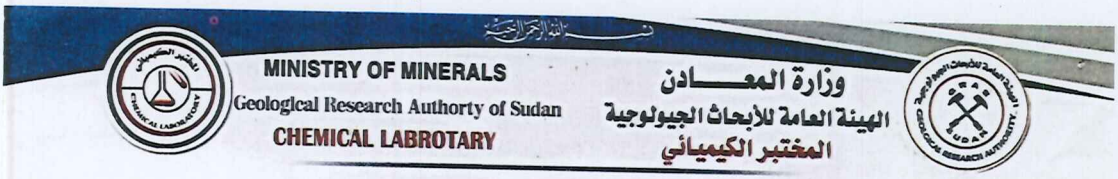
Dr. Reem Hassan Ahmed
Head department of Taxonomy & Phytochemistry
Institute (MAPRTMI)

Prof. Awatif Ahmed Mohamed
Director of Medicinal and Aromatic Plants Research &Tradition Medicine

ص.ب ٢٤٠٤ الخرطوم. السودان .ت: ١٨٣ ٧٧٣٧٧١ .م.م. ١٨٣ ٧٨٦٠٨٦ فاكس : ٢٤٩ ١٨٣ ٧٨٦٠٨٥+
P. O. Box: 2404,Khartoum-SUDAN - Tel: +249 183 786086 - +249 183 773771 Fax: (+249) 183-786085
www.mapri.eud.sd

Appendix B

Minerals of *Adansonia digitata*:



Report No (136-2017)

Equipment: A.A.S

Acid digestion

Sample lab		PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
Lab No	Sender No	Ca	Mg	Na	Fe	Cu	Zn	Mn	Ni
652	------	1.38	4.93	347	0.226	0.013	0.0141	0.017	0.13

Sender reference : مروة مجزوب سعيد

laboratory Manger

Zobida Idris Hassan

10/07/2017

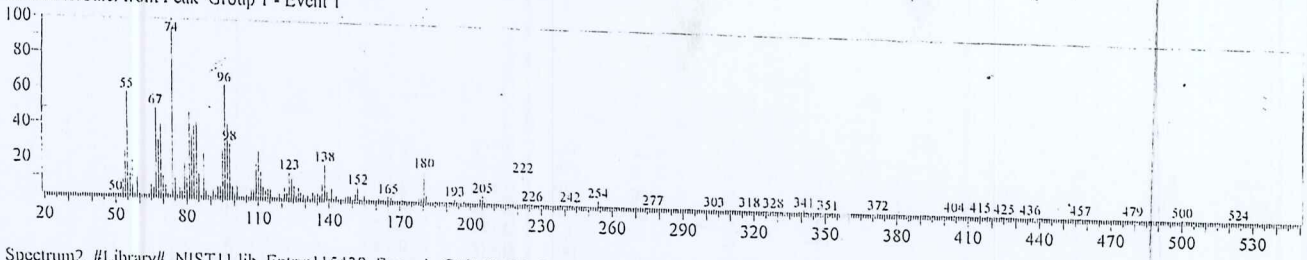
Appendix C:

digitata free fatty acids:

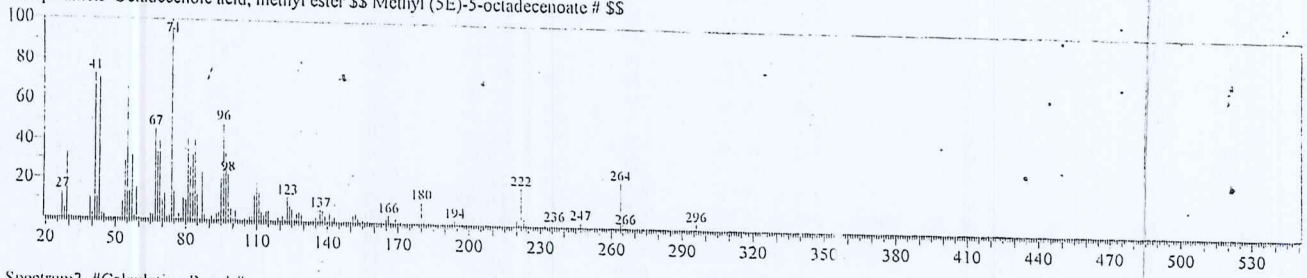
Peak	Retention time	Area %	Name
1	14.029	0.36	Methyl tetradecanoate
2	14.855	0.02	6-Octadecenoic acid, methyl ester
3	14.958	0.02	5-Octadecenoic acid, methyl ester
4	15.117	0.08	Pentadecenoic acid, methyl ester
5	15.853	0.03	7,10-Hexdecadienoic acid, methyl ester
6	15.915	0.08	Methyl hexadec-9-enate
7	15.956	0.25	9-Hexadecenoic acid, metyl ester, (Z)-
8	16.189	21.03	Hexadecenoic acid, metyl ester
9	16.807	0.06	Hexadecenoic acid, ethyl ester
10	16.855	0.49	Methyl 9,12-heptadecadienoate
11	16.905	0.53	Cis-10-Heptadecenoic acid, methyl ester
12	17.125	0.42	Heptadecenoic acid, methyl ester
13	17.591	6.88	Methyl 2-octyleyelopropene-1-heptanoate
14	17.861	27.60	9,12-Octadecadienoic acid (Z,Z)-, methyl
15	17.919	22.81	9-Octadecenoic acid (Z)-, methyl
16	18.079	7.03	Methyl Stearate
17	18.498	3.48	Methyl 2-octyleyelopropene-1-octanoate
18	18.851	4.75	Cyclopropaneoetanoic acid, 2-octyl-, meth
19	19.627	0.72	11-Eicosenoic acid, methyl ester
20	19.821	1.88	Eicosanoic acid, methyl ester
21	20.647	0.04	Heneicosanoic acid, methyl ester
22	21.442	0.70	Docosanoic acid, methyl ester
23	22.206	0.15	Tricosanoic acid, methyl ester

Spectrum Comparison

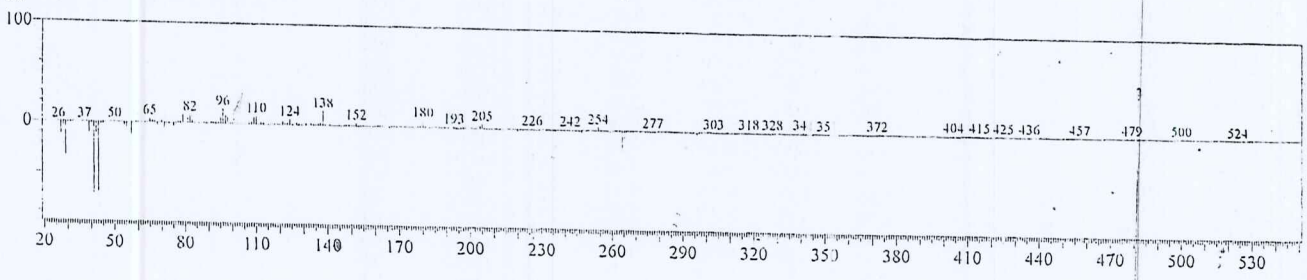
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:14.960(Scan#:2393)
MassPeaks:314
RawMode:Averaged 14.955-14.965(2392-2394) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:115438 Formula:C19H36O2 CAS:56554-45-1 MolWeight:296
MassPeaks:233 BasePeak:74.00(10000)
CompName:5-Octadecenoic acid, methyl ester $$ Methyl (5E)-5-octadecenoate # $$



Spectrum3 #Calculation Result#
MassPeaks:385 BasePeak:96.10(1385)

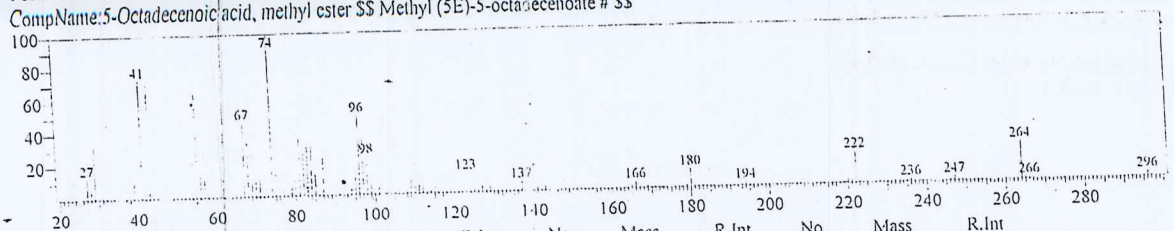


Compound Information

Entry:115438 Library:NIST11.LIB

Formula:C19H36O2 CAS:56554-45-1 MolWeight:296 RetIndex:2085

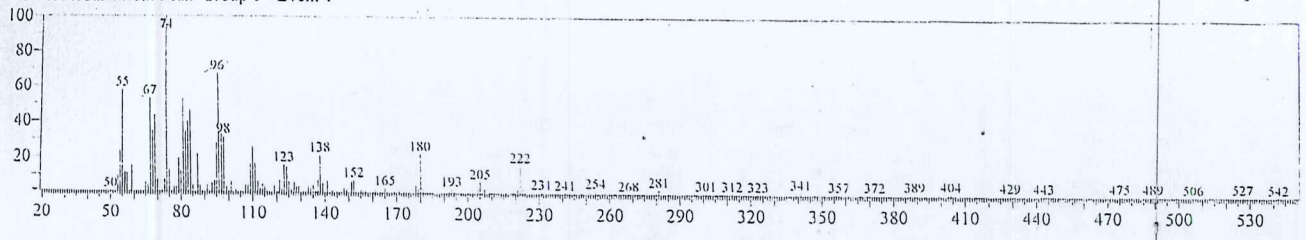
CompName:5-Octadecenoic acid, methyl ester $$ Methyl (5E)-5-octadecenoate # $$



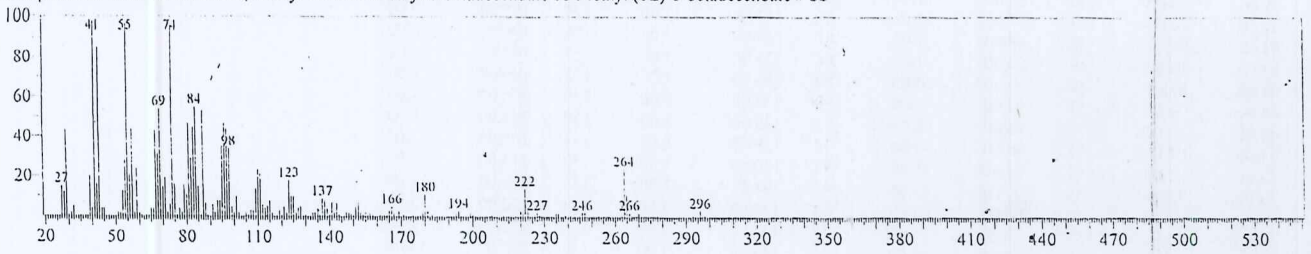
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	26.00	0.60	60	89.00	0.30	119	148.00	1.10	178	211.00	0.20
2	27.00	13.00	61	90.00	0.10	120	149.00	1.20	179	212.00	0.10
3	28.00	5.20	62	91.00	2.10	121	150.00	0.60	180	213.00	0.80
4	29.00	33.00	63	92.00	0.70	122	151.00	3.80	181	214.00	0.40
5	30.00	0.90	64	93.00	3.70	123	152.00	4.40	182	215.00	0.10
6	31.00	1.30	65	94.00	4.40	124	153.00	1.90	183	217.00	0.20
7	32.00	0.50	66	95.00	21.00	125	154.00	0.50	184	218.00	0.10
8	33.00	0.30	67	96.00	49.00	126	155.00	1.40	185	219.00	0.10
9	36.00	0.30	68	97.00	34.00	127	156.00	0.40	186	220.00	3.40
10	37.00	0.20	69	98.00	23.00	128	157.00	1.10	187	221.00	2.00
11	38.00	0.30	70	99.00	6.10	129	158.00	0.30	188	222.00	19.00
12	39.00	11.00	71	100.00	1.10	130	159.00	0.10	189	223.00	3.80
13	40.00	2.40	72	101.00	5.10	131	161.00	0.70	190	224.00	0.40
14	41.00	73.01	73	102.00	0.60	132	162.00	0.30	191	225.00	0.20
15	42.00	11.00	74	103.00	0.10	133	163.00	0.60	192	226.00	0.10
16	43.00	71.01	75	104.00	0.10	134	164.00	0.70	193	227.00	0.30
17	44.00	2.80	76	105.00	0.90	135	165.00	2.30	194	228.00	0.30
18	45.00	2.40	77	106.00	0.60	136	166.00	4.00	195	229.00	0.20
19	46.00	0.10	78	107.00	2.20	137	167.00	1.30	196	230.00	0.40
20	47.00	0.10	79	108.00	2.30	138	168.00	0.40	197	231.00	0.30
21	50.00	0.20	80	109.00	13.00	139	169.00	2.20	198	232.00	1.40
22	51.00	0.60	81	110.00	19.00	140	170.00	0.40	199	233.00	0.10
23	52.00	0.70	82	111.00	15.00	141	171.00	0.80	200	234.00	0.10
24	53.00	9.00	83	112.00	4.50	142	172.00	0.20	201	235.00	1.30
25	54.00	29.00	84	113.00	3.10	143	174.00	0.10	202	236.00	1.60
26	55.00	66.01	85	114.00	4.90	144	175.00	0.50	203	237.00	0.40
27	56.00	14.00	86	115.00	5.40	145	176.00	0.20	204	238.00	0.10
28	57.00	32.00	87	116.00	0.90	146	177.00	0.40	205	239.00	0.20
29	58.00	1.60	88	117.00	0.20	147	178.00	0.40	206	240.00	0.10
30	59.00	16.00	89	118.00	0.20	148	179.00	1.40	207	241.00	0.20
31	60.00	0.70	90	119.00	2.00	149	180.00	11.00	208	242.00	0.10
32	61.00	0.40	91	120.00	0.70	150	181.00	2.20	209	245.00	0.20
33	62.00	0.10	92	121.00	2.80	151	182.00	0.40	210	246.00	1.30
34	63.00	0.20	93	122.00	1.30	152	183.00	1.20	211	247.00	2.60
35	64.00	0.10	94	123.00	12.00	153	184.00	0.30	212	248.00	0.60
36	65.00	2.60	95	124.00	7.90	154	185.00	0.60	213	249.00	0.30
37	66.00	2.80	96	125.00	6.20	155	186.00	0.30	214	250.00	0.10
38	67.00	46.00	97	126.00	1.60	156	187.00	0.10	215	253.00	0.70
39	68.00	34.00	98	127.00	3.90	157	189.00	0.30	216	254.00	0.20
40	69.00	40.00	99	128.00	5.10	158	190.00	0.20	217	255.00	0.30
41	70.00	10.00	100	129.00	3.40	159	191.00	0.30	218	256.00	0.10
42	71.00	13.00	101	130.00	0.80	160	192.00	0.20	219	263.00	0.40
43	72.00	1.60	102	131.00	0.20	161	193.00	1.10	220	264.00	23.00
44	73.00	2.60	103	132.00	0.10	162	194.00	2.30	221	265.00	7.80
45	74.00	100.00	104	133.00	1.50	163	195.00	0.60	222	266.00	1.20
46	75.00	14.00	105	134.00	1.50	164	196.00	0.20	223	267.00	0.40
47	76.00	0.80	106	135.00	2.30	165	197.00	0.30	224	268.00	0.20
48	77.00	3.00	107	136.00	0.90	166	198.00	0.10	225	269.00	0.10
49	78.00	1.20	108	137.00	6.10	167	199.00	0.80	226	278.00	0.30
50	79.00	11.00	109	138.00	5.60	168	200.00	0.40	227	279.00	0.10
51	80.00	10.00	110	139.00	3.20	169	201.00	0.10	228	294.00	0.10
52	81.00	42.00	111	140.00	0.90	170	203.00	0.20	229	295.00	0.10
53	82.00	26.00	112	141.00	5.20	171	204.00	0.10	230	296.00	3.14
54	83.00	33.00	113	142.00	1.40	172	205.00	0.20	231	297.00	0.70
55	84.00	41.00	114	143.00	2.60	173	206.00	0.20	232	298.00	0.30
56	85.00	13.00	115	144.00	0.40	174	207.00	0.80	233	299.00	0.10
57	86.00	1.00	116	145.00	0.20	175	208.00	0.80			
58	87.00	24.00	117	146.00	0.10	176	209.00	0.40			
59	88.00	2.90	118	147.00	1.00	177	210.00	0.20			

Spectrum Comparison

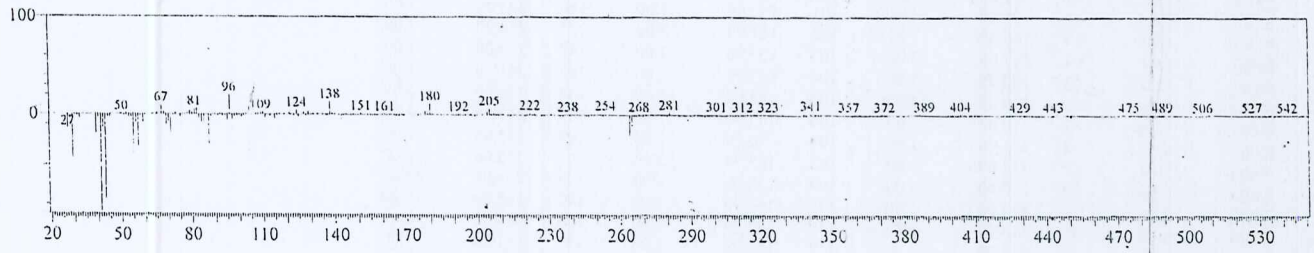
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:14.855(Scan#:2372)
MassPeaks:305
RawMode:Averaged 14.850-14.860(2371-2373) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:115439 Formula:C19H36O2 CAS:52355-31-4 MolWeight:296
MassPeaks:156 BasePeak:74.00(10000)
CompName:6-Octadecenoic acid, methyl ester $$ Methyl 6-octadecenoate $$ Methyl (6E)-6-octadecenoate # $$

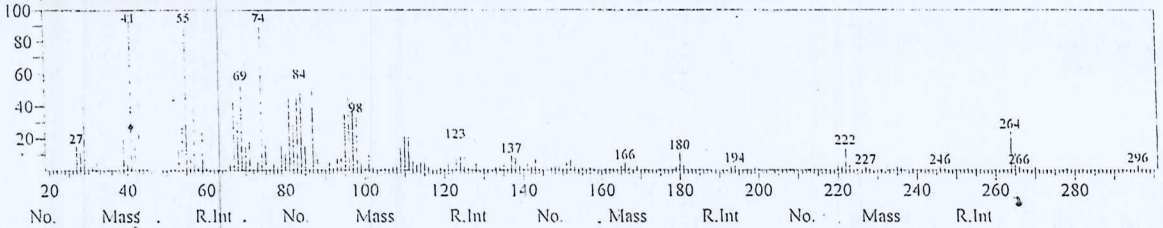


Spectrum3 #Calculation Result#
MassPeaks:340 BasePeak:96.10(2018)



Compound Information

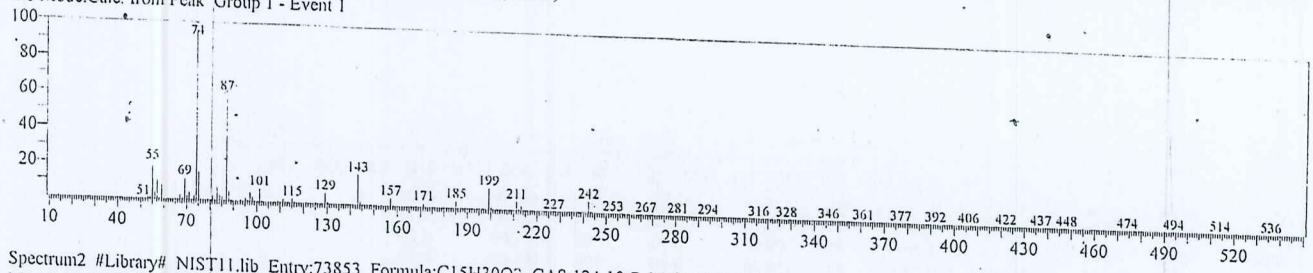
Entry:115439 Library:NIST11.LIB
Formula:C19H36O2 CAS:52355-31-4 MolWeight:296 RetIndex:2085
CompName:6-Octadecenoic acid, methyl ester $$ Methyl 6-octadecenoate $$ Methyl (6E)-6-octadecenoate # $$



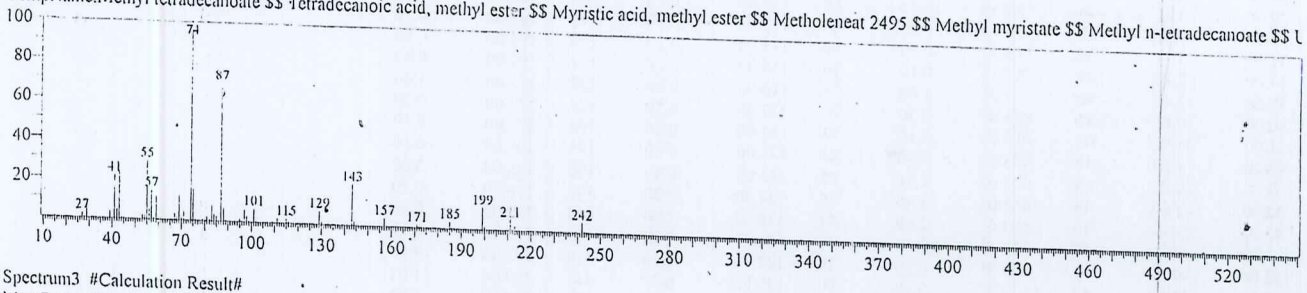
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	27.00	15.00	40	80.00	11.00	79	124.00	10.00	118	171.00	1.00
2	28.00	12.00	41	81.00	47.00	80	125.00	10.00	119	175.00	1.00
3	29.00	44.60	42	82.00	29.00	81	126.00	2.00	120	179.00	2.00
4	30.00	1.00	43	83.00	45.00	82	127.00	4.00	121	180.00	11.00
5	31.00	2.00	44	84.00	55.01	83	128.00	5.00	122	181.00	3.00
6	32.00	5.00	45	85.00	15.00	84	129.00	0.50	123	183.00	1.00
7	39.00	20.00	46	86.00	1.00	85	130.00	1.00	124	185.00	1.00
8	40.00	4.00	47	87.00	53.01	86	133.00	2.00	125	193.00	2.00
9	41.00	98.01	48	88.00	7.00	87	134.00	2.00	126	194.00	3.00
10	42.00	16.00	49	89.00	1.00	88	135.00	4.00	127	195.00	1.00
11	43.00	85.01	50	91.00	6.00	89	136.00	1.00	128	199.00	2.00
12	44.00	4.00	51	92.00	2.00	90	137.00	9.00	129	200.00	1.00
13	45.00	4.00	52	93.00	8.00	91	138.00	8.00	130	207.00	1.00
14	51.00	2.00	53	94.00	8.00	92	139.00	4.00	131	208.00	1.00
15	52.00	2.00	54	95.00	35.00	93	140.00	1.00	132	213.00	1.00
16	53.00	13.00	55	96.00	47.00	94	141.00	7.00	133	214.00	1.00
17	54.00	28.00	56	97.00	44.00	95	142.00	2.00	134	220.00	3.00
18	55.00	97.01	57	98.00	34.00	96	143.00	7.00	135	221.00	2.00
19	56.00	21.00	58	99.00	5.00	97	144.00	1.00	136	222.00	14.00
20	57.00	44.00	59	100.00	2.00	98	147.00	2.00	137	223.00	3.00
21	58.00	2.00	60	101.00	10.00	99	148.00	2.00	138	227.00	2.00
22	59.00	25.00	61	102.00	2.00	100	149.00	2.00	139	228.00	1.00
23	60.00	2.00	62	105.00	2.00	101	150.00	1.00	140	235.00	2.00
24	61.00	1.00	63	106.00	1.00	102	151.00	5.00	141	236.00	2.00
25	65.00	4.00	64	107.00	3.00	103	152.00	7.00	142	239.00	1.00
26	66.00	4.00	65	108.00	3.00	104	153.00	2.00	143	241.00	1.00
27	67.00	43.00	66	109.00	14.00	105	154.00	1.00	144	246.00	2.00
28	68.00	31.00	67	110.00	24.00	106	155.00	2.00	145	247.00	2.00
29	69.00	54.01	68	111.00	21.00	107	156.00	1.00	146	253.00	1.00
30	70.00	15.00	69	112.00	6.00	108	157.00	2.00	147	255.00	1.00
31	71.00	19.00	70	113.00	4.00	109	158.00	1.00	148	264.00	24.00
32	72.00	2.00	71	114.00	5.00	110	161.00	1.00	149	265.00	11.00
33	73.00	6.00	72	115.00	8.00	111	162.00	1.00	150	266.00	2.00
34	74.00	100.00	73	116.00	2.00	112	163.00	1.00	151	267.00	1.00
35	75.00	16.00	74	119.00	3.00	113	164.00	1.00	152	270.00	2.00
36	76.00	1.00	75	120.00	1.00	114	165.00	3.00	153	278.00	1.00
37	77.00	4.00	76	121.00	5.00	115	166.00	5.00	154	296.00	3.04
38	78.00	2.00	77	122.00	2.00	116	167.00	2.00	155	297.00	1.00
39	79.00	16.00	78	123.00	18.00	117	169.00	3.00	156	298.00	1.00

Spectrum Comparison

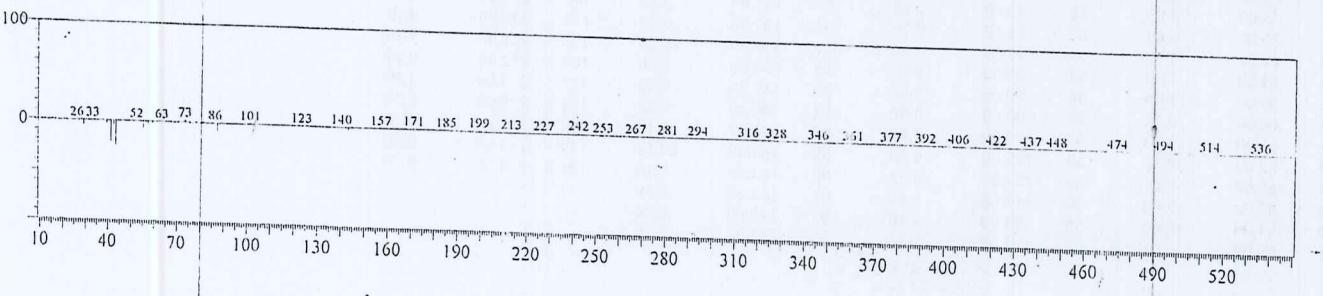
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:14.040(Scan#:3209)
MassPeaks:281
RawMode:Averaged 14.035-14.045(2208-2210) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:73853 Formula:C15H30O2 CAS:124-10-7 MolWeight:242
MassPeaks:121 BasePeak:74.00(10000)
CompName:Methyl tetradecanoate $$ Tetradecanoic acid, methyl ester $$ Myristic acid, methyl ester $$ Metholeneat 2495 $$ Methyl myristate $$ Methyl n-tetradecanoate $$ U



Spectrum3 #Calculation Result#
MassPeaks:227 BasePeak:73.15(242)

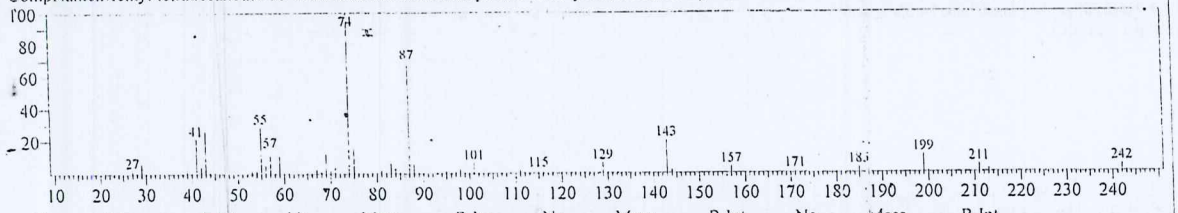


Compound Information

Entry:73853 Library:NIST11.LIB

Formula:C15H30O2 CAS:124-10-7 MolWeight:242 RetIndex:1680

CompName:Methyl tetradecanoate $$ Tetradecanoic acid, methyl ester $$ Myristic acid, methyl ester $$ Metholene 2495 $$ Methyl myristate $$ Methyl n



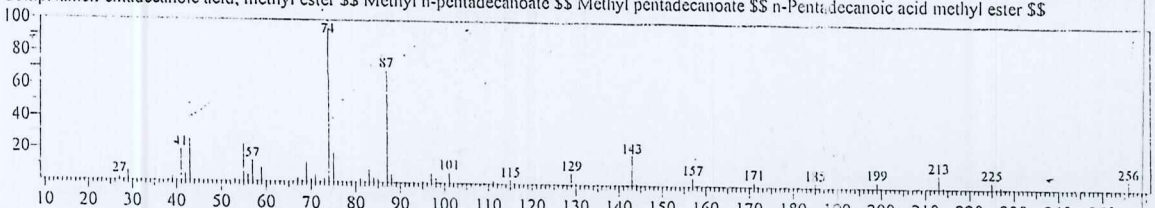
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	15.00	0.50	32	70.00	2.30	63	108.00	0.10	94	154.00	0.10
2	26.00	0.10	33	71.00	4.20	64	109.00	0.90	95	157.00	4.20
3	27.00	2.30	34	72.00	0.30	65	110.00	0.40	96	158.00	0.50
4	28.00	0.80	35	74.00	100.00	66	111.00	2.30	97	163.00	0.10
5	29.00	6.21	36	75.00	15.51	67	112.00	0.70	98	166.00	0.20
6	30.00	0.20	37	76.00	0.90	68	113.00	0.30	99	167.00	0.10
7	31.00	0.30	38	77.00	0.30	69	114.00	0.10	100	168.00	0.40
8	33.00	0.10	39	78.00	0.10	70	115.00	2.20	101	169.00	0.10
9	39.00	3.40	40	79.00	1.00	71	116.00	0.90	102	171.00	1.40
10	40.00	0.80	41	80.00	0.30	72	117.00	0.10	103	172.00	0.20
11	41.00	21.42	42	81.00	2.10	73	121.00	0.50	104	177.00	0.10
12	42.00	4.90	43	82.00	0.90	74	122.00	0.10	105	181.00	0.10
13	43.00	26.02	44	83.00	7.61	75	123.00	0.40	106	185.00	3.60
14	44.00	1.00	45	84.00	3.40	76	124.00	0.20	107	186.00	0.50
15	45.00	1.10	46	85.00	2.40	77	125.00	1.00	108	187.00	0.10
16	51.00	0.20	47	87.00	69.17	78	126.00	0.20	109	191.00	0.10
17	52.00	0.10	48	88.00	6.31	79	127.00	0.10	110	192.00	0.10
18	53.00	2.10	49	89.00	0.50	80	129.00	6.71	111	199.00	11.01
19	54.00	2.10	50	91.00	0.10	81	130.00	1.30	112	200.00	1.60
20	55.00	28.93	51	93.00	0.60	82	131.00	0.10	113	201.00	0.20
21	56.00	5.40	52	94.00	0.20	83	135.00	0.40	114	209.00	0.10
22	57.00	14.41	53	95.00	1.70	84	137.00	0.20	115	211.00	5.30
23	58.00	1.00	54	96.00	0.70	85	138.00	0.20	116	212.00	0.80
24	59.00	11.51	55	97.00	5.91	86	139.00	0.40	117	213.00	2.20
25	60.00	0.40	56	98.00	3.00	87	140.00	0.10	118	214.00	0.30
26	61.00	0.20	57	99.00	0.60	88	141.00	0.10	119	222.00	5.10
27	65.00	0.40	58	100.00	0.30	89	143.00	20.52	120	243.00	0.90
28	66.00	0.20	59	101.00	6.71	90	144.00	2.10	121	244.00	0.10
29	67.00	3.00	60	102.00	0.60	91	145.00	0.20			
30	68.00	1.40	61	103.00	0.10	92	149.00	0.20			
31	69.00	12.61	62	107.00	0.50	93	153.00	0.20			

Compound Information

Entry:84388 Library:NIST11.LIB

Formula:C16H32O2 CAS:7132-64-1 MolWeight:256 RetIndex:1779

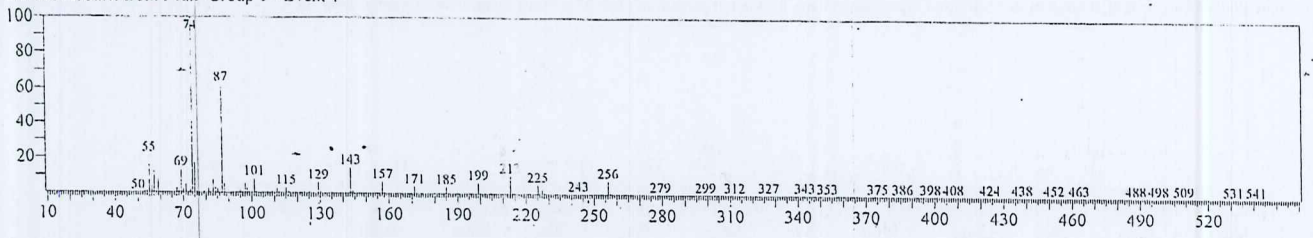
CompName:Pentadecanoic acid, methyl ester $$ Methyl n-pentadecanoate $$ Methyl pentadecanoate $$ n-Pentadecanoic acid methyl ester $$



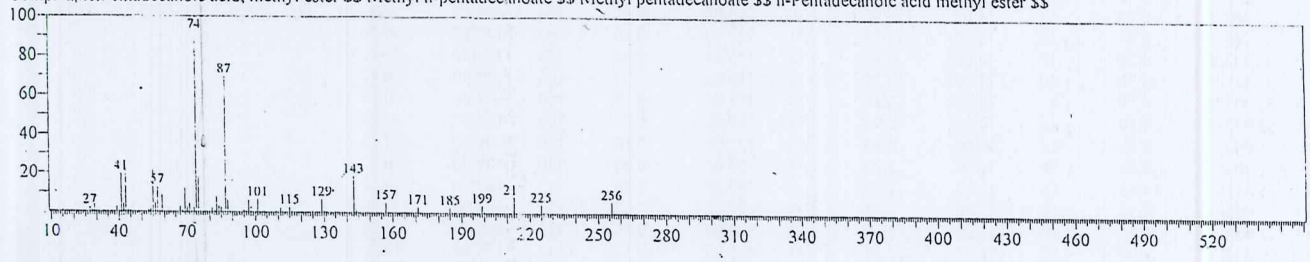
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	15.00	0.60	34	71.00	4.60	67	110.00	0.40	100	157.00	5.30
2	26.00	0.10	35	72.00	0.40	68	111.00	2.20	101	158.00	0.70
3	27.00	2.30	36	73.00	2.30	69	112.00	0.70	102	159.00	0.10
4	28.00	0.80	37	74.00	100.00	70	113.00	0.40	103	163.00	0.10
5	29.00	6.31	38	75.00	18.12	71	114.00	0.10	104	167.00	0.10
6	30.00	0.20	39	76.00	0.90	72	115.00	2.70	105	171.00	3.10
7	31.00	0.30	40	77.00	0.30	73	116.00	1.00	106	172.00	0.40
8	33.00	0.10	41	78.00	0.10	74	117.00	0.10	107	177.00	0.10
9	38.00	0.10	42	79.00	0.90	75	121.00	0.50	108	180.00	0.20
10	39.00	2.80	43	80.00	0.30	76	122.00	0.10	109	181.00	0.10
11	40.00	0.60	44	81.00	2.20	77	123.00	0.40	110	182.00	0.30
12	41.00	19.42	45	82.00	1.00	78	124.00	0.20	111	183.00	0.10
13	42.00	4.50	46	83.00	7.81	79	125.00	1.00	112	185.00	2.80
14	43.00	26.22	47	84.00	3.40	80	126.00	0.20	113	186.00	0.40
15	44.00	1.00	48	85.00	2.50	81	127.00	0.10	114	195.00	0.10
16	45.00	1.00	49	87.00	69.57	82	129.00	7.01	115	199.00	3.90
17	51.00	0.10	50	88.00	6.21	83	130.00	1.30	116	200.00	0.60
18	52.00	0.10	51	89.00	0.50	84	131.00	0.10	117	201.00	0.10
19	53.00	1.50	52	91.00	0.20	85	135.00	0.40	118	205.00	0.10
20	54.00	1.70	53	93.00	0.60	86	136.00	0.10	119	213.00	8.41
21	55.00	23.02	54	94.00	0.20	87	137.00	0.20	120	214.00	1.20
22	56.00	4.50	55	95.00	1.70	88	138.00	0.20	121	215.00	0.10
23	57.00	12.81	56	96.00	0.80	89	139.00	0.50	122	223.00	0.10
24	58.00	0.90	57	97.00	6.21	90	140.00	0.10	123	225.00	4.50
25	59.00	9.11	58	98.00	3.00	91	141.00	0.10	124	226.00	0.80
26	60.00	0.30	59	99.00	0.60	92	143.00	18.72	125	227.00	1.90
27	61.00	0.20	60	100.00	0.30	93	144.00	1.80	126	228.00	0.30
28	65.00	0.30	61	101.00	6.61	94	145.00	0.20	127	256.00	6.01
29	66.00	0.20	62	102.00	0.70	95	149.00	0.20	128	257.00	1.20
30	67.00	2.70	63	103.00	0.10	96	151.00	0.10	129	258.00	0.10
31	68.00	1.30	64	107.00	0.50	97	152.00	0.10			
32	69.00	12.21	65	108.00	0.10	98	153.00	0.30			
33	70.00	2.30	66	109.00	0.90	99	154.00	0.10			

Spectrum Comparison

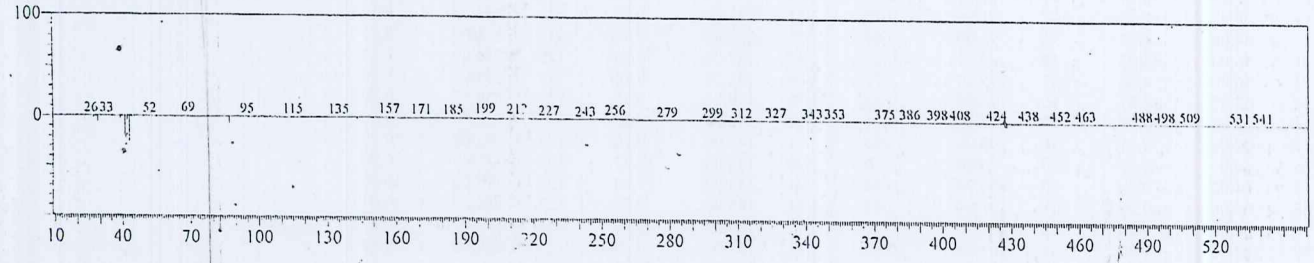
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:15.115(Scan#:2424)
MassPeaks:297
RawMode:Averaged 15.110-15.120(2423-2425) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:84388 Formula:C16H32O2 CAS:7132-64-1 MolWeight:256
MassPeaks:129 BasePeak:74.00(10000)
CompName:Pentadecanoic acid, methyl ester $$ Methyl n-pentadecanoate $$ Methyl pentadecanoate $$ n-Pentadecanoic acid methyl ester $$

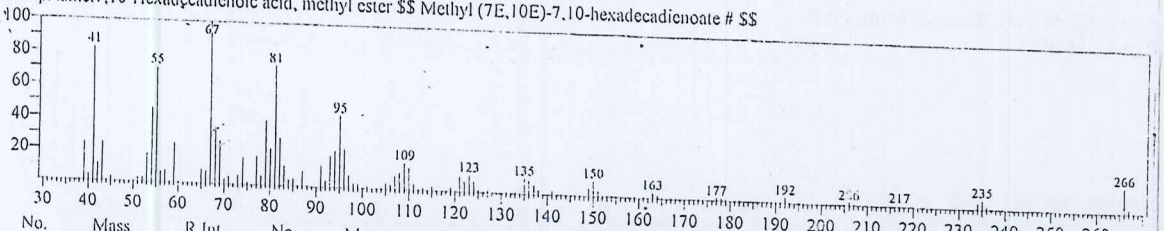


Spectrum3 #Calculation Result#
MassPeaks:299 BasePeak:199.15(226)



Compound Information

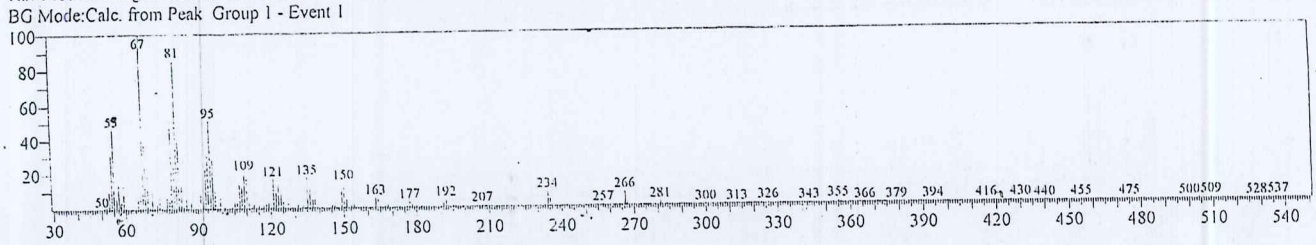
Entry:91874 Library:NIST11.LIB
Formula:C17H30O2 CAS:16106-03-9 MolWeight:266 RetIndex:1894
CompName:7,10-Hexadecadienoic acid, methyl ester $$ Methyl (7E,10E)-7,10-hexadecadienoate # $$



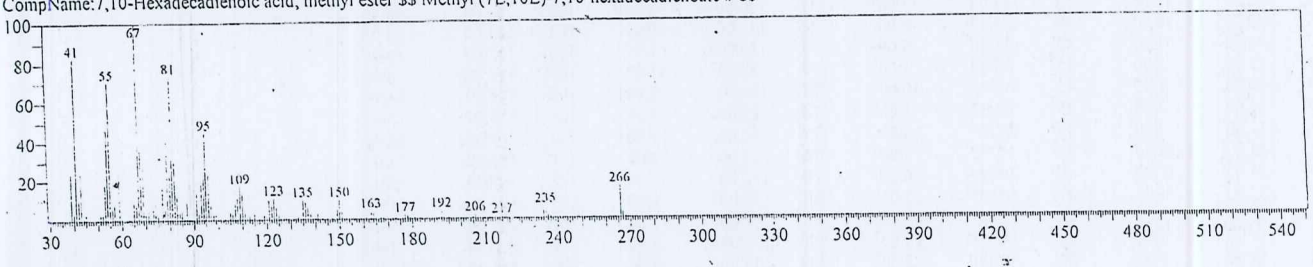
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	38.00	1.00	34	79.00	41.00	67	115.00	3.00	100	154.00	1.00
2	39.00	24.00	35	80.00	23.00	68	117.00	1.00	101	155.00	1.00
3	40.00	4.00	36	81.00	74.01	69	118.00	1.00	102	159.00	1.00
4	41.00	83.01	37	82.00	30.00	70	119.00	3.00	103	161.00	1.00
5	42.00	11.00	38	83.00	13.00	71	120.00	2.00	104	163.00	4.00
6	43.00	24.00	39	84.00	4.00	72	121.00	10.00	105	164.00	3.00
7	44.00	1.00	40	85.00	5.00	73	122.00	7.00	106	165.00	1.00
8	45.00	3.00	41	86.00	1.00	74	123.00	11.00	107	167.00	1.00
9	50.00	1.00	42	87.00	10.00	75	124.00	7.00	108	168.00	1.00
10	51.00	3.00	43	88.00	1.00	76	125.00	3.00	109	173.00	1.00
11	52.00	3.00	44	91.00	14.00	77	126.00	1.00	110	177.00	2.00
12	53.00	18.00	45	92.00	4.00	78	127.00	2.00	111	178.00	2.00
13	54.00	47.00	46	93.00	20.00	79	128.00	1.00	112	179.00	1.00
14	55.00	71.01	47	94.00	23.00	80	129.00	1.00	113	181.00	1.00
15	56.00	7.00	48	95.00	45.00	81	131.00	1.00	114	182.00	1.00
16	57.00	8.00	49	96.00	24.00	82	132.00	1.00	115	190.00	1.00
17	58.00	1.00	50	97.00	8.00	83	133.00	2.00	116	191.00	1.00
18	59.00	25.00	51	98.00	3.00	84	134.00	1.00	117	192.00	4.00
19	60.00	1.00	52	99.00	3.00	85	135.00	10.00	118	193.00	1.00
20	63.00	1.00	53	100.00	1.00	86	136.00	9.00	119	195.00	1.00
21	65.00	9.00	54	101.00	2.00	87	137.00	6.00	120	205.00	1.00
22	66.00	8.00	55	103.00	1.00	88	138.00	3.00	121	206.00	2.00
23	67.00	100.00	56	104.00	1.00	89	139.00	1.00	122	207.00	1.00
24	68.00	36.00	57	105.00	4.00	90	140.00	1.00	123	217.00	1.00
25	69.00	27.00	58	106.00	3.00	91	141.00	3.00	124	234.00	4.00
26	70.00	3.00	59	107.00	9.00	92	143.00	1.00	125	235.00	6.00
27	71.00	5.00	60	108.00	11.00	93	145.00	1.00	126	236.00	2.00
28	72.00	1.00	61	109.00	17.00	94	147.00	1.00	127	237.00	1.00
29	73.00	6.00	62	110.00	14.00	95	149.00	5.00	128	246.00	16.04
30	74.00	17.00	63	111.00	4.00	96	150.00	10.00	129	247.00	3.00
31	75.00	2.00	64	112.00	1.00	97	151.00	4.00	130	266.00	1.00
32	77.00	18.00	65	113.00	2.00	98	152.00	1.00			
33	78.00	6.00	66	114.00	1.00	99	153.00	1.00			

Spectrum Comparison

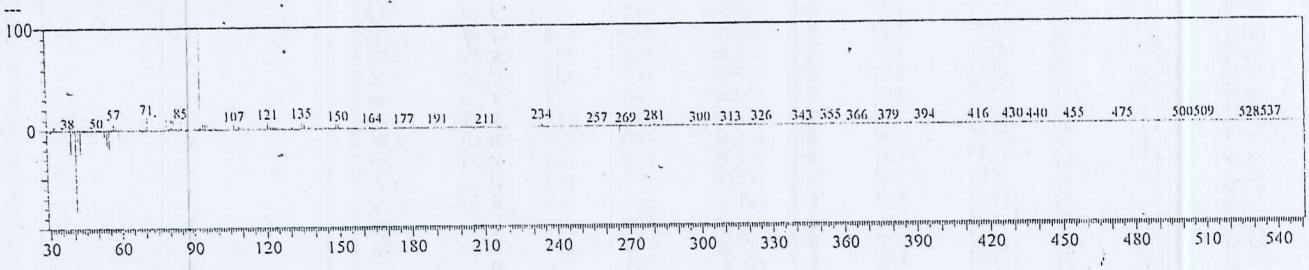
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:15.855(Scan#:2572)
MassPeaks:298
RawMode:Averaged 15.850-15.860(2571-2573) BasePeak:67.10(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:91874 Formula:C17H30O2 CAS:16106-03-9 MolWeight:266
MassPeaks:130 BasePeak:67.00(10000)
CompName:7,10-Hexadecadienoic acid, methyl ester $$ Methyl (7E,10E)-7,10-hexadecadienoate # $$

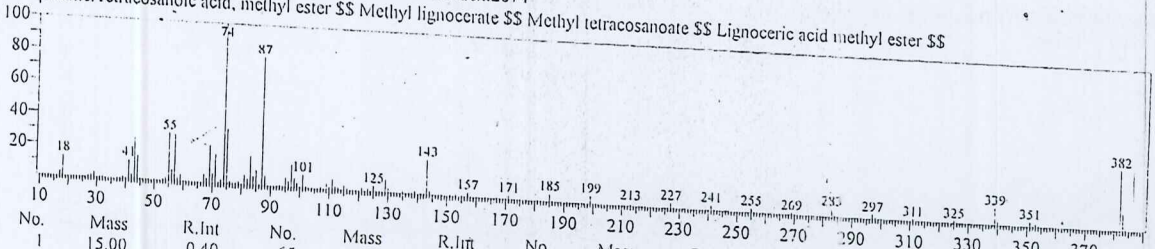


Spectrum3 #Calculation Result#
MassPeaks:309 BasePeak:71.10(1254)



Compound Information

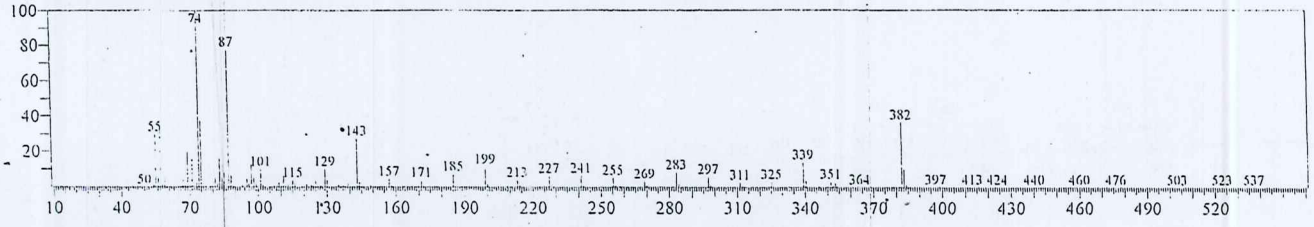
Entry:29299 Library:NIST11S.LIB
Formula:C25H50O2 CAS:2442-49-1 MolWeight:382 RetIndex:2674
CompName:Tetracosanoic acid, methyl ester $$ Methyl lignocerate $$ Methyl tetracosanoate $$ Lignoceric acid methyl ester $$



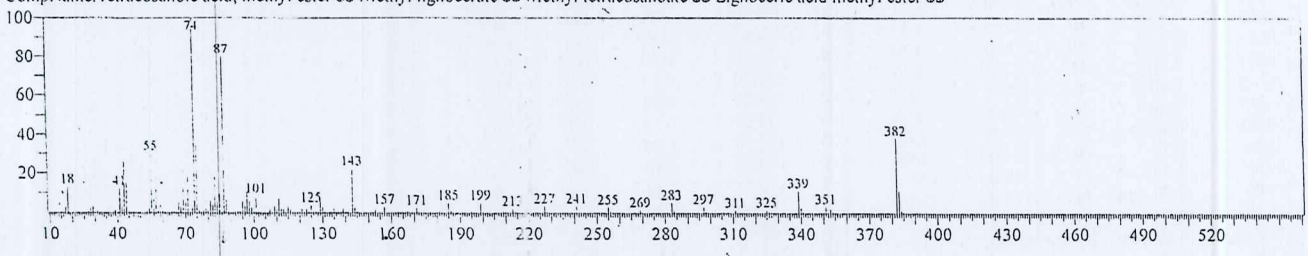
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	15.00	0.40	65	97.00	14.01	129	167.00	1.10	193	249.00	0.20
2	16.00	0.30	66	98.00	5.91	130	168.00	0.50	194	250.00	0.30
3	17.00	3.30	67	99.00	2.90	131	169.00	0.60	195	251.00	0.40
4	18.00	13.01	68	100.00	0.90	132	170.00	0.20	196	252.00	0.30
5	26.00	0.20	69	101.00	8.31	133	171.00	2.60	197	253.00	0.20
6	27.00	1.20	70	102.00	1.20	134	172.00	0.80	198	255.00	2.90
7	28.00	2.30	71	103.00	0.30	135	173.00	0.30	199	256.00	0.90
8	29.00	3.40	72	106.00	0.40	136	175.00	0.20	200	257.00	0.30
9	30.00	0.40	73	107.00	1.60	137	176.00	0.20	201	261.00	0.20
10	31.00	1.30	74	108.00	0.50	138	177.00	0.70	202	263.00	0.20
11	32.00	0.60	75	109.00	3.60	139	178.00	0.30	203	264.00	0.30
12	38.00	0.30	76	110.00	1.90	140	179.00	0.40	204	265.00	0.30
13	39.00	1.60	77	111.00	7.01	141	180.00	0.40	205	266.00	0.20
14	40.00	0.50	78	112.00	2.10	142	181.00	0.80	206	267.00	0.30
15	41.00	12.01	79	113.00	1.80	143	182.00	0.40	207	269.00	1.50
16	42.00	3.30	80	114.00	0.50	144	183.00	0.40	208	270.00	0.40
17	43.00	26.02	81	115.00	3.30	145	185.00	5.10	209	275.00	0.30
18	44.00	15.01	82	116.00	1.70	146	186.00	1.40	210	277.00	0.20
19	45.00	1.00	83	117.00	0.60	147	187.00	0.30	211	278.00	0.20
20	46.00	0.20	84	118.00	0.20	148	191.00	0.60	212	279.00	0.30
21	50.00	0.40	85	119.00	0.80	149	192.00	0.30	213	280.00	0.30
22	51.00	0.50	86	120.00	0.60	150	193.00	0.30	214	281.00	0.20
23	52.00	0.40	87	121.00	2.00	151	194.00	0.40	215	283.00	5.20
24	53.00	1.20	88	122.00	0.60	152	195.00	0.70	216	284.00	1.40
25	54.00	2.10	89	123.00	2.10	153	196.00	0.50	217	285.00	0.30
26	55.00	30.03	90	124.00	1.10	154	197.00	0.40	218	292.00	0.20
27	56.00	7.21	91	125.00	3.90	155	199.00	5.10	219	293.00	0.30
28	57.00	29.03	92	126.00	1.00	156	200.00	0.50	220	294.00	0.20
29	58.00	2.00	93	127.00	1.20	157	205.00	0.50	221	295.00	0.20
30	59.00	4.60	94	128.00	0.50	158	206.00	0.20	222	297.00	3.10
31	60.00	0.90	95	129.00	8.31	159	207.00	0.30	223	298.00	1.10
32	61.00	0.40	96	130.00	2.90	160	208.00	0.30	224	299.00	0.30
33	64.00	0.80	97	131.00	0.60	161	209.00	0.60	225	306.00	0.30
34	65.00	0.50	98	132.00	0.20	162	210.00	0.40	226	307.00	0.20
35	66.00	0.40	99	133.00	0.50	163	211.00	0.50	227	308.00	0.40
36	67.00	5.71	100	134.00	0.30	164	212.00	0.20	228	309.00	0.30
37	68.00	3.10	101	135.00	1.90	165	213.00	2.10	229	311.00	1.40
38	69.00	23.02	102	136.00	0.50	166	214.00	0.70	230	312.00	0.50
39	70.00	5.81	103	137.00	1.20	167	215.00	0.20	231	314.00	0.20
40	71.00	18.02	104	138.00	0.80	168	218.00	0.20	232	321.00	0.20
41	72.00	1.20	105	139.00	2.30	169	219.00	0.30	233	322.00	0.20
42	73.00	2.60	106	140.00	0.70	170	220.00	0.20	234	323.00	0.20
43	74.00	100.00	107	141.00	1.00	171	221.00	0.30	235	325.00	1.70
44	75.00	34.03	108	142.00	0.40	172	222.00	0.30	236	326.00	0.80
45	76.00	2.00	109	143.00	22.02	173	223.00	0.50	237	327.00	0.20
46	77.00	1.00	110	144.00	2.50	174	224.00	0.40	238	338.00	0.30
47	78.00	1.20	111	145.00	0.50	175	225.00	0.40	239	339.00	11.01
48	79.00	2.10	112	146.00	0.30	176	226.00	0.20	240	340.00	2.80
49	80.00	1.10	113	147.00	0.40	177	227.00	3.40	241	341.00	0.50
50	81.00	6.31	114	148.00	0.40	178	228.00	0.90	242	343.00	0.20
51	82.00	4.10	115	151.00	0.80	179	229.00	0.30	243	349.00	0.30
52	83.00	18.02	116	152.00	0.60	180	231.00	0.20	244	350.00	0.30
53	84.00	5.91	117	153.00	1.60	181	232.00	0.20	245	351.00	3.30
54	85.00	9.41	118	154.00	0.60	182	233.00	0.30	246	352.00	0.90
55	86.00	1.00	119	155.00	0.70	183	235.00	0.20	247	353.00	2.10
56	87.00	80.08	120	156.00	0.20	184	236.00	0.20	248	354.00	1.00
57	88.00	6.61	121	157.00	3.10	185	237.00	0.50	249	356.00	0.30
58	89.00	0.70	122	158.00	0.70	186	238.00	0.30	250	381.00	0.20
59	90.00	0.20	123	159.00	0.30	187	239.00	0.50	251	382.00	38.03
60	92.00	0.60	124	162.00	0.20	188	240.00	0.20	252	383.00	11.01
61	93.00	1.60	125	163.00	0.90	189	241.00	3.40	253	384.00	1.70
62	94.00	1.10	126	164.00	0.30	190	242.00	1.00	254	385.00	0.30
63	95.00	5.91	127	165.00	0.50	191	243.00	0.20			
64	96.00	3.60	128	166.00	0.50	192	247.00	0.20			

Spectrum Comparison

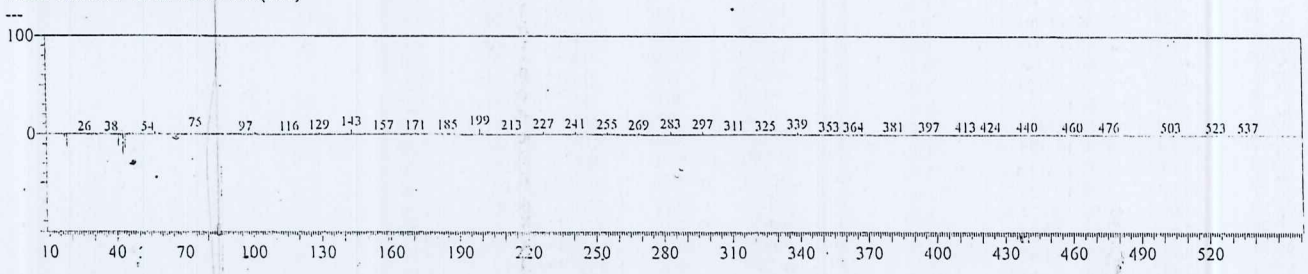
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:22.945(Scan#:3990)
MassPeaks:352
RawMode:Averaged 22.940-22.950(3989-3991) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11s.lib Entry:29299 Formula:C25H50O2 CAS:2442-49-1 MolWeight:382
MassPeaks:254 BasePeak:74.00(10000)
CompName:Tetracosanoic acid, methyl ester $$ Methyl lignocerate $$ Methyl tetracosanoate $$ Lignoceric acid methyl ester $$

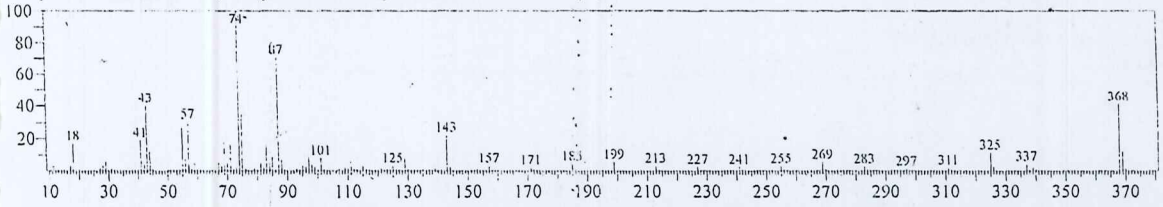


Spectrum3 #Calculation Result#
MassPeaks:368 BasePeak:199.15(615)



Compound Information

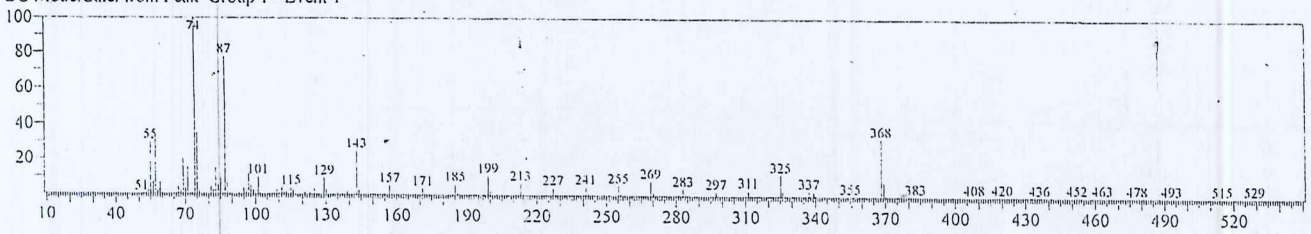
Entry:28980 Library:NIST11S.LIB
Formula:C24H48O2 CAS:2433-97-8 MolWeight:368 RetIndex:2574
CompName:Tricosanoic acid, methyl ester $$ Methyl tricosanoate $$



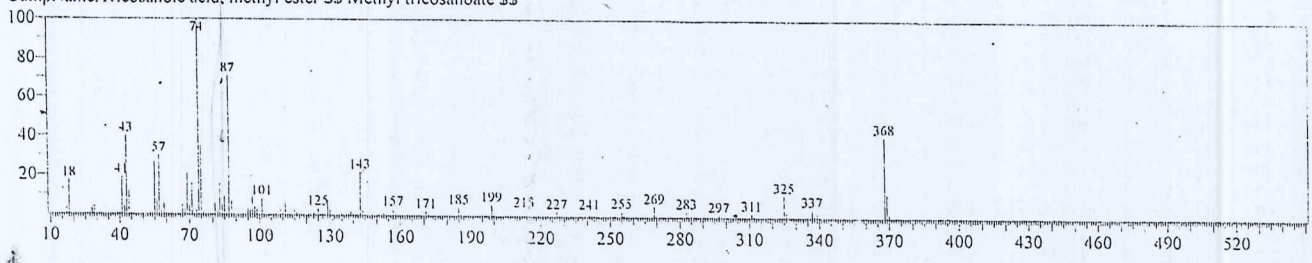
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	15.00	0.80	62	95.00	3.70	123	166.00	0.30	184	251.00	0.30
2	16.00	0.40	63	96.00	2.40	124	167.00	1.00	185	252.00	0.30
3	17.00	3.30	64	97.00	9.81	125	168.00	0.40	186	253.00	0.20
4	18.00	17.02	65	98.00	4.70	126	169.00	0.50	187	255.00	3.00
5	26.00	0.20	66	99.00	2.40	127	170.00	0.20	188	256.00	1.00
6	27.00	1.60	67	100.00	0.60	128	171.00	2.20	189	257.00	0.20
7	28.00	3.20	68	101.00	8.31	129	172.00	0.80	190	261.00	0.20
8	29.00	6.01	69	102.00	1.10	130	173.00	0.20	191	263.00	0.20
9	30.00	0.50	70	103.00	0.20	131	177.00	0.60	192	264.00	0.20
10	31.00	1.70	71	106.00	0.20	132	178.00	0.20	193	265.00	0.30
11	32.00	0.90	72	107.00	1.30	133	179.00	0.30	194	266.00	0.30
12	38.00	0.20	73	108.00	0.40	134	180.00	0.30	195	267.00	0.30
13	39.00	1.40	74	109.00	2.90	135	181.00	0.70	196	269.00	5.40
14	40.00	0.50	75	110.00	1.40	136	182.00	0.30	197	270.00	1.40
15	41.00	19.02	76	111.00	6.31	137	183.00	0.40	198	271.00	0.30
16	42.00	4.10	77	112.00	1.70	138	185.00	4.40	199	275.00	0.20
17	43.00	40.04	78	113.00	1.50	139	186.00	1.30	200	277.00	0.20
18	44.00	12.01	79	114.00	0.30	140	187.00	0.20	201	278.00	0.20
19	45.00	1.10	80	115.00	3.00	141	191.00	0.40	202	279.00	0.20
20	46.00	0.30	81	116.00	1.60	142	192.00	0.20	203	280.00	0.20
21	50.00	0.30	82	117.00	0.40	143	193.00	0.30	204	283.00	2.90
22	51.00	0.20	83	118.00	0.20	144	194.00	0.30	205	284.00	0.80
23	52.00	0.20	84	119.00	0.40	145	195.00	0.90	206	285.00	0.20
24	53.00	1.30	85	120.00	0.20	146	196.00	0.50	207	289.00	0.20
25	54.00	1.70	86	121.00	1.70	147	197.00	0.40	208	292.00	0.20
26	55.00	27.02	87	122.00	0.40	148	199.00	5.61	209	293.00	0.20
27	56.00	7.51	88	123.00	1.70	149	200.00	0.60	210	294.00	0.50
28	57.00	30.03	89	124.00	0.80	150	205.00	0.40	211	295.00	0.20
29	58.00	2.00	90	125.00	3.40	151	206.00	0.20	212	297.00	1.40
30	59.00	5.50	91	126.00	0.90	152	207.00	0.30	213	298.00	0.70
31	60.00	0.70	92	127.00	1.10	153	208.00	0.30	214	299.00	0.20
32	61.00	0.40	93	128.00	0.30	154	209.00	0.50	215	307.00	0.20
33	64.00	0.20	94	129.00	8.01	155	210.00	0.30	216	308.00	0.20
34	65.00	0.30	95	130.00	2.80	156	211.00	0.30	217	309.00	0.20
35	66.00	0.30	96	131.00	0.50	157	212.00	0.20	218	311.00	2.10
36	67.00	5.00	97	133.00	0.30	158	213.00	3.30	219	312.00	0.80
37	68.00	2.90	98	134.00	0.20	159	214.00	0.80	220	313.00	0.20
38	69.00	21.02	99	135.00	1.50	160	215.00	0.20	221	318.00	0.20
39	70.00	5.10	100	136.00	0.40	161	217.00	0.20	222	319.00	0.30
40	71.00	16.01	101	137.00	1.10	162	219.00	0.30	223	320.00	0.20
41	72.00	1.10	102	138.00	0.60	163	221.00	0.30	224	321.00	0.20
42	73.00	2.60	103	139.00	2.00	164	222.00	0.20	225	323.00	0.20
43	74.00	100.00	104	140.00	0.70	165	223.00	0.40	226	325.00	11.01
44	75.00	35.03	105	141.00	0.80	166	224.00	0.30	227	326.00	2.70
45	76.00	1.60	106	142.00	0.20	167	225.00	0.30	228	327.00	0.40
46	77.00	0.50	107	143.00	22.02	168	226.00	0.20	229	328.00	0.20
47	78.00	0.50	108	144.00	2.50	169	227.00	2.50	230	334.00	0.20
48	79.00	1.50	109	145.00	0.30	170	228.00	0.70	231	335.00	0.40
49	80.00	0.70	110	147.00	0.20	171	229.00	0.20	232	336.00	0.30
50	81.00	5.81	111	148.00	0.20	172	231.00	0.20	233	337.00	4.20
51	82.00	2.00	112	151.00	0.70	173	233.00	0.30	234	338.00	1.10
52	83.00	16.01	113	152.00	0.50	174	236.00	0.20	235	339.00	2.20
53	84.00	5.30	114	153.00	1.40	175	237.00	0.40	236	340.00	0.80
54	85.00	9.01	115	154.00	0.50	176	238.00	0.30	237	341.00	0.20
55	86.00	0.60	116	155.00	0.60	177	239.00	0.30	238	367.00	0.30
56	87.00	71.07	117	157.00	3.40	178	241.00	2.40	239	368.00	41.04
57	88.00	6.81	118	158.00	0.70	179	242.00	0.80	240	369.00	12.01
58	89.00	0.70	119	159.00	0.20	180	243.00	0.20	241	370.00	1.90
59	92.00	0.30	120	163.00	0.90	181	247.00	0.20	242	371.00	0.40
60	93.00	1.30	121	164.00	0.30	182	248.00	0.20			
61	94.00	0.60	122	165.00	0.40	183	250.00	0.30			

Spectrum Comparison

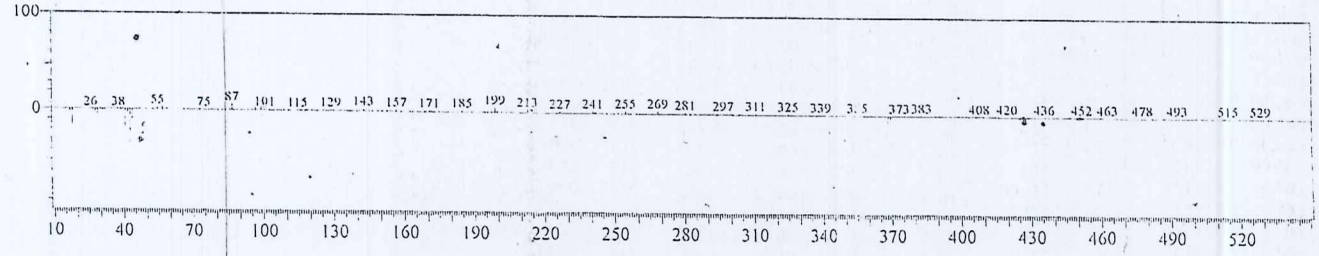
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:22.205(Scan#:3842)
MassPeaks:301
RawMode:Averaged 22.200-22.210(3841-3843) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11s.lib Entry:28980 Formula:C24H48O2 CAS:2433-97-8 MolWeight:368
MassPeaks:242 BasePeak:74.00(10000)
CompName:Tricosanoic acid, methyl ester $$ Methyl tricosanoate $$



Spectrum3 #Calculation Result#
MassPeaks:352 BasePeak:87.05(652)

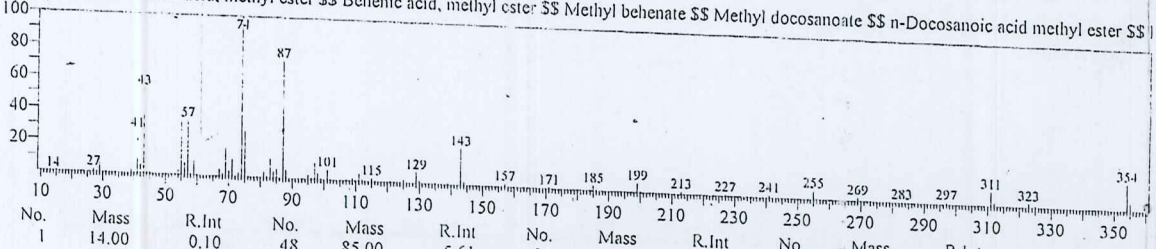


Compound Information

Entry:158427 Library:NIST11.LIB

Formula:C23H46O2 CAS:929-77-1 MolWeight:354 RetIndex:2475

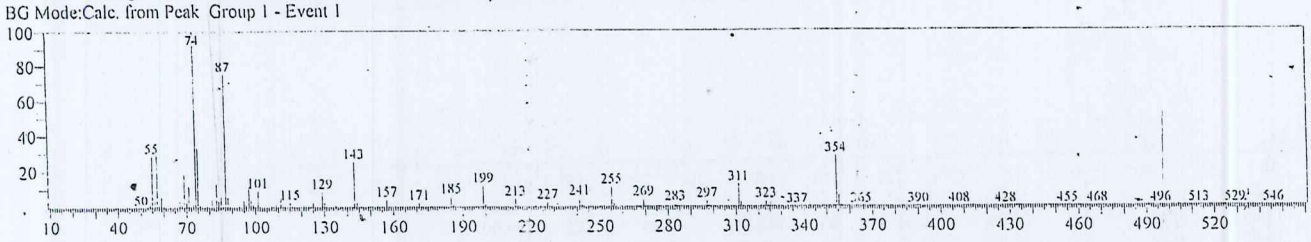
CompName:Docosanoic acid, methyl ester $$ Behenic acid, methyl ester $$ Methyl behenate $$ Methyl docosanoate $$ n-Docosanoic acid methyl ester $$ I



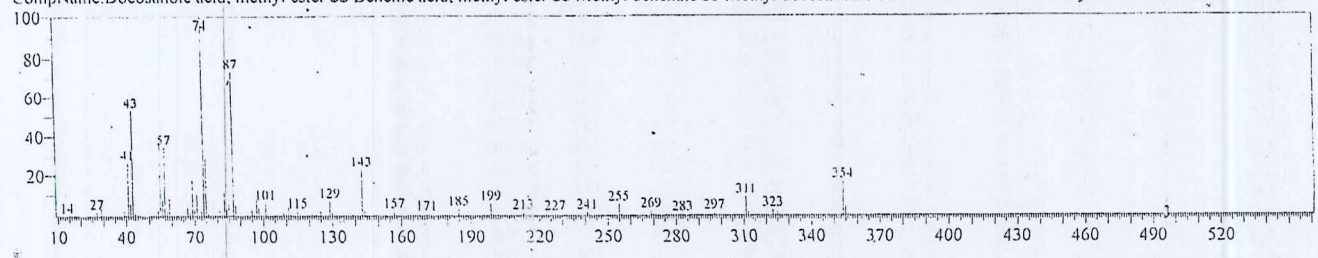
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	14.00	0.10	48	85.00	5.61	95	141.00	0.20	142	219.00	0.10
2	15.00	0.50	49	87.00	73.48	96	143.00	23.02	143	222.00	0.10
3	16.00	0.10	50	88.00	5.50	97	144.00	2.20	144	223.00	0.10
4	26.00	0.10	51	89.00	0.50	98	145.00	0.20	145	224.00	0.10
5	27.00	1.90	52	91.00	0.20	99	148.00	0.10	146	227.00	1.00
6	29.00	7.41	53	93.00	0.80	100	149.00	0.80	147	228.00	0.20
7	30.00	0.30	54	94.00	0.30	101	150.00	0.10	148	233.00	0.10
8	31.00	0.30	55	95.00	2.90	102	151.00	0.10	149	235.00	0.10
9	33.00	0.10	56	96.00	1.30	103	152.00	0.10	150	236.00	0.10
10	39.00	2.50	57	97.00	10.01	104	153.00	0.60	151	237.00	0.20
11	40.00	0.60	58	98.00	4.00	105	154.00	0.20	152	238.00	0.10
12	41.00	26.62	59	99.00	1.20	106	155.00	0.10	153	241.00	1.70
13	42.00	5.91	60	100.00	0.30	107	157.00	2.20	154	242.00	0.40
14	43.00	53.46	61	101.00	6.41	108	158.00	0.30	155	251.00	0.10
15	44.00	1.70	62	102.00	0.60	109	163.00	0.40	156	252.00	0.10
16	45.00	1.20	63	103.00	0.10	110	164.00	0.10	157	255.00	5.50
17	51.00	0.10	64	105.00	0.10	111	165.00	0.10	158	256.00	0.90
18	52.00	0.10	65	107.00	0.80	112	166.00	0.10	159	257.00	0.10
19	53.00	1.40	66	108.00	0.20	113	167.00	0.40	160	261.00	0.10
20	54.00	2.90	67	109.00	1.70	114	168.00	0.10	161	265.00	0.10
21	55.00	38.33	68	110.00	0.70	115	169.00	0.10	162	269.00	2.30
22	56.00	7.91	69	111.00	4.50	116	171.00	1.00	163	270.00	0.40
23	57.00	34.43	70	112.00	1.00	117	172.00	0.30	164	271.00	0.10
24	58.00	2.00	71	113.00	0.70	118	173.00	0.10	165	278.00	0.10
25	59.00	8.81	72	114.00	0.20	119	177.00	0.20	166	279.00	0.10
26	60.00	0.50	73	115.00	2.30	120	178.00	0.10	167	280.00	0.10
27	61.00	0.30	74	116.00	1.30	121	179.00	0.10	168	283.00	0.70
28	65.00	0.30	75	117.00	0.10	122	180.00	0.10	169	284.00	0.10
29	66.00	0.20	76	119.00	0.10	123	181.00	0.20	170	297.00	1.40
30	67.00	4.30	77	121.00	1.20	124	182.00	0.10	171	298.00	0.40
31	68.00	1.90	78	122.00	0.20	125	185.00	3.30	172	299.00	0.10
32	69.00	18.02	79	123.00	0.90	126	186.00	0.80	173	304.00	0.10
33	70.00	3.30	80	124.00	0.40	127	187.00	0.10	174	305.00	0.10
34	71.00	10.71	81	125.00	2.20	128	191.00	0.10	175	311.00	9.11
35	72.00	0.80	82	126.00	0.40	129	193.00	0.10	176	312.00	2.00
36	73.00	2.50	83	127.00	0.30	130	195.00	0.20	177	313.00	0.30
37	74.00	100.00	84	128.00	0.10	131	196.00	0.10	178	321.00	0.10
38	75.00	28.43	85	129.00	7.11	132	199.00	5.81	179	322.00	0.10
39	76.00	1.30	86	130.00	2.00	133	200.00	0.90	180	323.00	2.60
40	77.00	0.30	87	131.00	0.20	134	201.00	0.10	181	324.00	0.70
41	78.00	0.10	88	133.00	0.10	135	205.00	0.10	182	325.00	1.60
42	79.00	0.90	89	135.00	1.00	136	208.00	0.10	183	326.00	0.40
43	80.00	0.30	90	136.00	0.20	137	209.00	0.10	184	327.00	0.10
44	81.00	3.40	91	137.00	0.40	138	210.00	0.10	185	354.00	16.72
45	82.00	1.50	92	138.00	0.20	139	213.00	1.70	186	355.00	4.40
46	83.00	11.81	93	139.00	1.00	140	214.00	0.20	187	356.00	0.50
47	84.00	3.90	94	140.00	0.20	141	215.00	0.10			

Spectrum Comparison

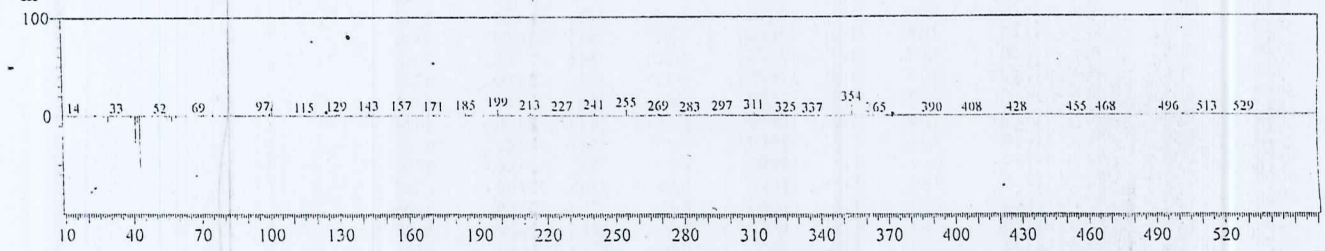
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:21.445(Scan#:3690)
MassPeaks:353
RawMode:Averaged 21.440-21.450(3689-3691) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:158427 Formula:C23H46O2 CAS:929-77-1 MolWeight:354
MassPeaks:187 BasePeak:74.00(10000)
CompName:Docosanoic acid, methyl ester $$ Behenic acid, methyl ester $$ Methyl behenate $$ Methyl docosanoate $$ n-Docosanoic acid methyl ester $$ Kemester 9022 $$



Spectrum3 #Calculation Result#
MassPeaks:309 BasePeak:354.35(1125)

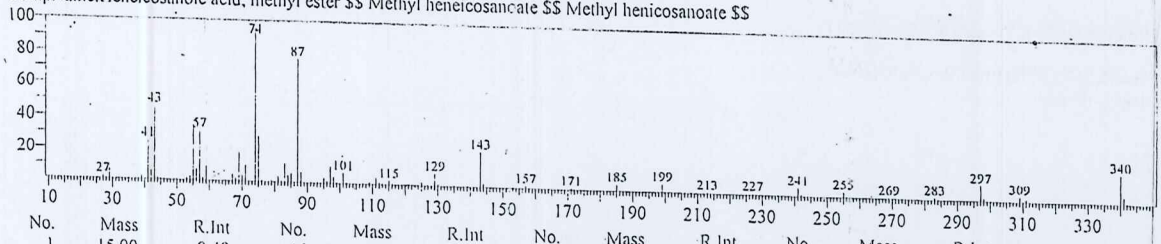


Compound Information

Entry:149089 Library:NIST11.LIB

Formula:C22H44O2 CAS:6064-90-0 MolWeight:340 RetIndex:2375

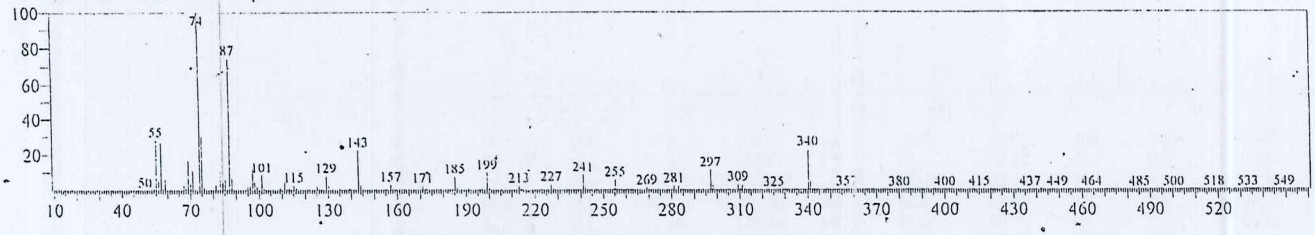
CompName:Heneicosanoic acid, methyl ester $$ Methyl heneicosanoate $$ Methyl henicosanoate $$



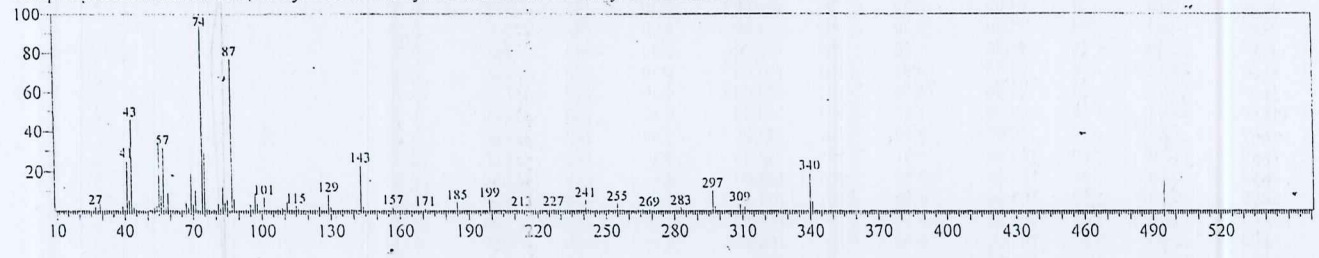
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	15.00	0.40	46	85.00	5.61	91	139.00	1.10	136	214.00	0.20
2	26.00	0.10	47	87.00	76.88	92	140.00	0.20	137	219.00	0.10
3	27.00	1.90	48	88.00	6.51	93	141.00	0.20	138	222.00	0.10
4	28.00	0.50	49	89.00	0.50	94	143.00	23.12	139	223.00	0.10
5	29.00	6.61	50	91.00	0.20	95	144.00	2.30	140	224.00	0.10
6	30.00	0.20	51	92.00	0.10	96	145.00	0.20	141	227.00	1.20
7	31.00	0.30	52	93.00	0.90	97	149.00	0.70	142	228.00	0.40
8	33.00	0.10	53	94.00	0.30	98	150.00	0.10	143	229.00	0.10
9	38.00	0.10	54	95.00	3.20	99	151.00	0.20	144	233.00	0.10
10	39.00	2.40	55	96.00	1.50	100	152.00	0.20	145	237.00	0.10
11	41.00	25.22	56	97.00	10.91	101	153.00	0.70	146	238.00	0.10
12	42.00	5.91	57	98.00	4.10	102	154.00	0.20	147	241.00	5.61
13	43.00	45.94	58	99.00	1.20	103	155.00	0.10	148	242.00	1.10
14	44.00	1.60	59	100.00	0.30	104	157.00	1.90	149	243.00	0.10
15	45.00	1.10	60	101.00	7.01	105	158.00	0.30	150	251.00	0.10
16	51.00	0.10	61	102.00	0.70	106	163.00	0.40	151	255.00	3.70
17	52.00	0.10	62	103.00	0.10	107	164.00	0.10	152	256.00	0.70
18	53.00	1.70	63	105.00	0.10	108	165.00	0.10	153	257.00	0.10
19	54.00	2.70	64	107.00	0.90	109	166.00	0.10	154	264.00	0.10
20	55.00	37.63	65	108.00	0.20	110	167.00	0.40	155	265.00	0.10
21	56.00	7.81	66	109.00	1.70	111	168.00	0.10	156	266.00	0.20
22	57.00	31.73	67	110.00	0.70	112	169.00	0.10	157	269.00	0.80
23	58.00	2.00	68	111.00	4.50	113	171.00	1.20	158	270.00	0.20
24	59.00	9.61	69	112.00	1.10	114	172.00	0.40	159	279.00	0.10
25	60.00	0.50	70	113.00	0.70	115	173.00	0.10	160	283.00	1.60
26	61.00	0.30	71	114.00	0.20	116	177.00	0.20	161	284.00	0.40
27	65.00	0.30	72	115.00	2.60	117	179.00	0.10	162	285.00	0.10
28	66.00	0.20	73	116.00	1.30	118	180.00	0.10	163	289.00	0.10
29	67.00	4.40	74	117.00	0.10	119	181.00	0.20	164	291.00	0.10
30	68.00	2.10	75	119.00	0.10	120	182.00	0.10	165	297.00	10.41
31	69.00	19.02	76	121.00	1.20	121	185.00	4.40	166	298.00	2.20
32	70.00	3.70	77	122.00	0.20	122	186.00	0.80	167	299.00	0.30
33	71.00	10.51	78	123.00	0.90	123	187.00	0.10	168	307.00	0.10
34	72.00	0.70	79	124.00	0.40	124	191.00	0.20	169	309.00	3.40
35	74.00	100.00	80	125.00	2.10	125	194.00	0.10	170	310.00	0.80
36	75.00	29.03	81	126.00	0.40	126	195.00	0.20	171	311.00	2.00
37	76.00	1.30	82	127.00	0.30	127	196.00	0.10	172	312.00	0.50
38	77.00	0.30	83	129.00	8.21	128	199.00	5.71	173	313.00	0.10
39	78.00	0.10	84	130.00	2.10	129	200.00	0.90	174	340.00	19.32
40	79.00	1.10	85	131.00	0.20	130	201.00	0.10	175	341.00	4.80
41	80.00	0.40	86	133.00	0.10	131	205.00	0.10	176	342.00	0.60
42	81.00	3.70	87	135.00	1.10	132	208.00	0.10	177	343.00	0.10
43	82.00	1.70	88	136.00	0.20	133	209.00	0.20			
44	83.00	13.01	89	137.00	0.40	134	210.00	0.10			
45	84.00	4.40	90	138.00	0.20	135	213.00	1.00			

Spectrum Comparison

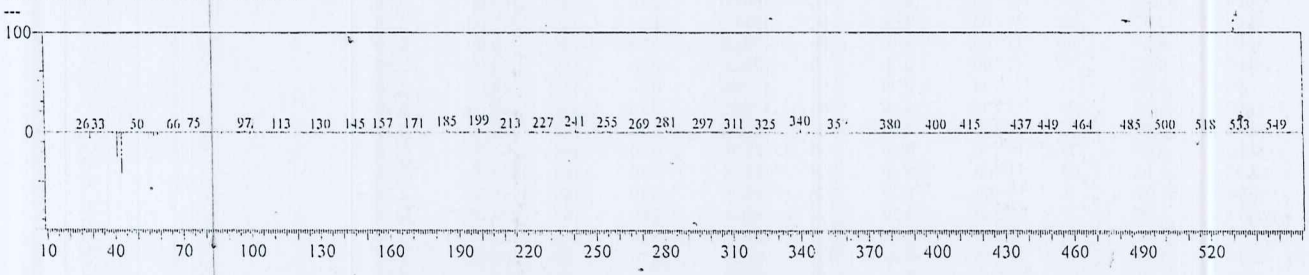
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:20.650(Scan#:3531)
MassPeaks:249
RawMode:Averaged 20.645-20.655(3530-3532) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:149089 Formula:C22H44O2 CAS:6064-90-0 MolWeight:340
MassPeaks:177 BasePeak:74.00(10000)
CompName:Henicosanoic acid, methyl ester $$ Methyl henicosanoate $$ Methyl henicosanoate $$



Spectrum3 #Calculation Result#
MassPeaks:299 BasePeak:199.15(438)

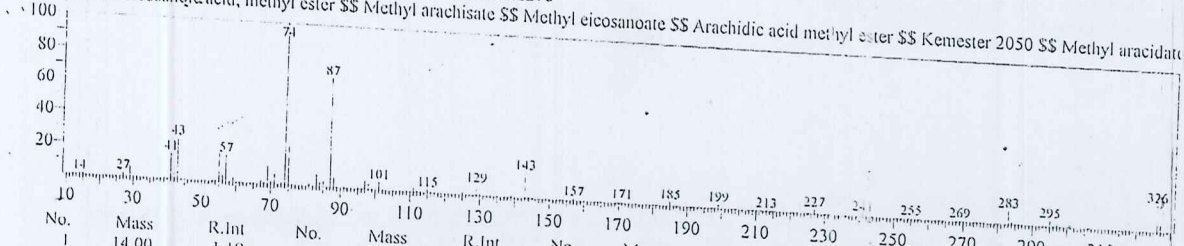


Compound Information

Entry:27503 Library:NIST11S.LIB

Formula:C21H42O2 CAS:1120-28-1 MolWeight:326 RetIndex:2276

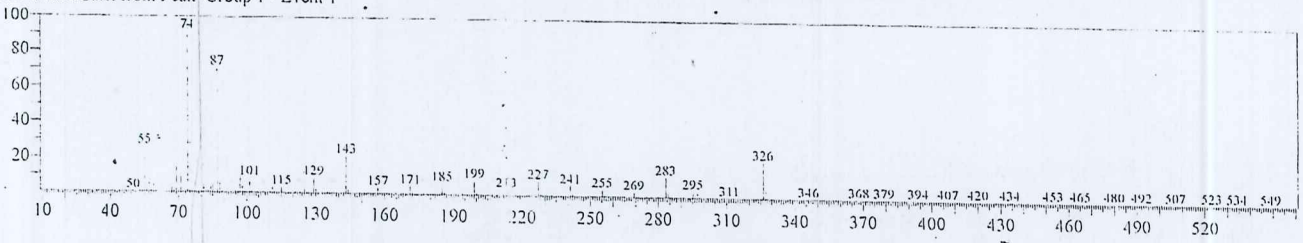
CompName:Eicosanoic acid, methyl ester $$ Methyl arachisate $$ Methyl eicosanoate $$ Arachidic acid methyl ester $$ Kemester 2050 $$ Methyl aracidat



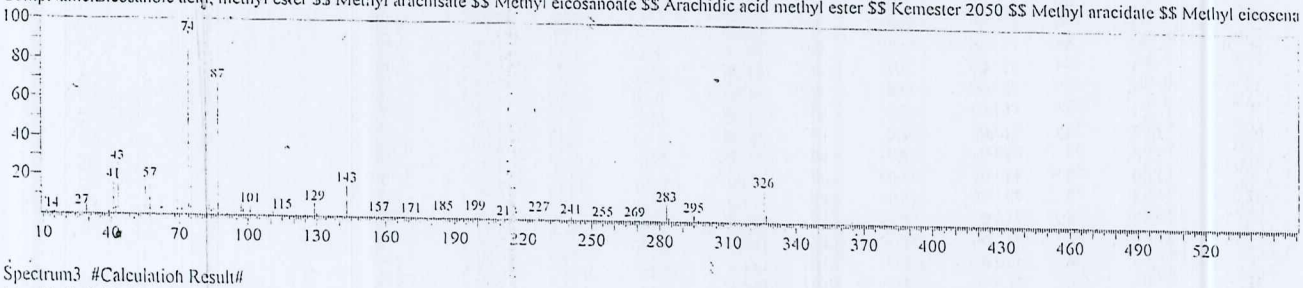
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	14.00	1.19	45	78.00	0.20	89	125.00	1.59	133	199.00	2.89
2	15.00	1.59	46	79.00	0.50	90	126.00	0.40	134	200.00	0.50
3	16.00	0.20	47	80.00	0.30	91	127.00	0.30	135	201.00	0.10
4	26.00	0.20	48	81.00	2.19	92	128.00	0.20	136	205.00	0.10
5	27.00	2.69	49	82.00	1.09	93	129.00	6.49	137	208.00	0.10
6	28.00	0.70	50	83.00	7.59	94	130.00	1.69	138	209.00	0.20
7	29.00	7.09	51	84.00	3.29	95	131.00	0.20	139	210.00	0.10
8	30.00	0.10	52	85.00	3.89	96	134.00	0.10	140	213.00	0.60
9	31.00	0.70	53	86.00	0.20	97	135.00	0.70	141	214.00	0.20
10	32.00	0.10	54	87.00	68.20	98	136.00	0.10	142	223.00	0.10
11	36.00	0.20	55	88.00	5.89	99	137.00	0.30	143	224.00	0.10
12	39.00	1.69	56	89.00	0.60	100	138.00	0.20	144	227.00	2.89
13	40.00	0.60	57	90.00	0.10	101	139.00	0.90	145	228.00	0.60
14	41.00	15.89	58	91.00	1.19	102	140.00	0.30	146	229.00	0.10
15	42.00	3.39	59	92.00	0.20	103	141.00	0.30	147	237.00	0.10
16	43.00	25.69	60	93.00	0.50	104	143.00	15.89	148	241.00	1.89
17	44.00	1.29	61	94.00	0.20	105	144.00	1.79	149	242.00	0.40
18	45.00	0.60	62	95.00	1.79	106	145.00	0.60	150	250.00	0.20
19	51.00	0.20	63	96.00	0.90	107	149.00	0.40	151	251.00	0.10
20	52.00	0.10	64	97.00	5.69	108	150.00	0.10	152	252.00	0.20
21	53.00	0.90	65	98.00	3.69	109	151.00	0.10	153	255.00	0.80
22	54.00	1.29	66	99.00	0.90	110	152.00	0.10	154	256.00	0.20
23	55.00	17.39	67	100.00	0.20	111	153.00	0.50	155	265.00	0.10
24	56.00	4.09	68	101.00	5.09	112	154.00	0.20	156	269.00	0.90
25	57.00	16.69	69	102.00	0.60	113	155.00	0.10	157	270.00	0.30
26	58.00	0.99	70	103.00	0.10	114	157.00	1.39	158	276.00	0.10
27	59.00	3.39	71	105.00	0.20	115	158.00	0.30	159	277.00	0.10
28	60.00	0.30	72	106.00	0.10	116	163.00	0.30	160	283.00	8.69
29	61.00	0.20	73	107.00	0.50	117	165.00	0.10	161	284.00	1.89
30	63.00	0.10	74	108.00	0.10	118	166.00	0.10	162	285.00	0.30
31	64.00	0.20	75	109.00	0.99	119	167.00	0.40	163	292.00	0.10
32	65.00	0.30	76	110.00	0.50	120	168.00	0.20	164	293.00	0.20
33	66.00	0.20	77	111.00	2.79	121	169.00	0.10	165	294.00	0.20
34	67.00	2.39	78	112.00	0.99	122	171.00	1.19	166	295.00	3.59
35	68.00	1.39	79	113.00	0.50	123	172.00	0.40	167	296.00	0.90
36	69.00	11.39	80	114.00	0.10	124	177.00	0.20	168	297.00	1.99
37	70.00	2.29	81	115.00	2.09	125	180.00	0.10	169	298.00	0.40
38	71.00	6.99	82	116.00	1.09	126	181.00	0.30	170	325.00	0.10
39	72.00	0.40	83	117.00	0.30	127	182.00	0.10	171	326.00	16.69
40	73.00	1.49	84	118.00	0.10	128	185.00	2.59	172	327.00	3.99
41	74.00	100.00	85	121.00	0.50	129	186.00	0.50	173	328.00	0.60
42	75.00	24.39	86	122.00	0.10	130	191.00	0.20			
43	76.00	1.29	87	123.00	0.50	131	195.00	0.20			
44	77.00	0.40	88	124.00	0.30	132	196.00	0.10			

Spectrum Comparison

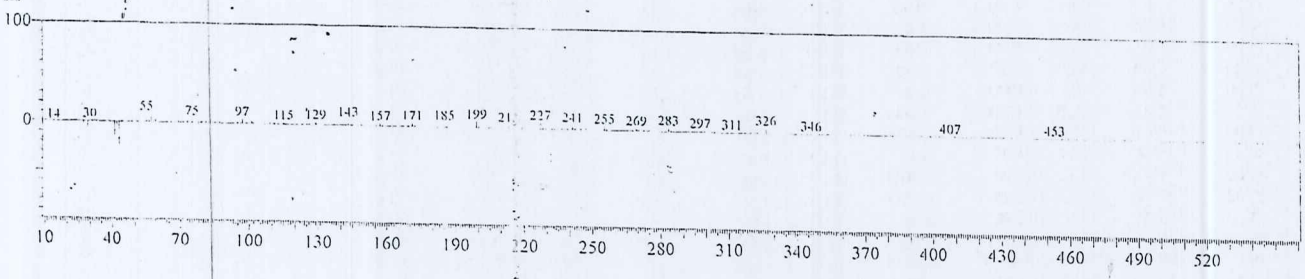
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:19.820(Scan#:3365)
MassPeaks:333
RawMode:Averaged 19.815-19.825(3364-3366) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST14s.lib Entry:27503 Formula:C21H42O2 CAS:1120-28-1 MolWeight:326
MassPeaks:173 BasePeak:74.00(10000)
CompName:Eicosanoic acid, methyl ester $$ Methyl arachisate $$ Methyl eicosanoate $$ Arachidic acid methyl ester $$ Kemester 2050 $$ Methyl aracidate $$ Methyl eicosena

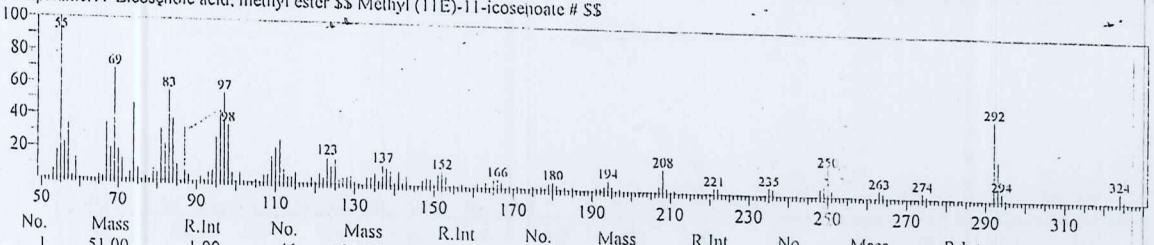


Spectrum3 #Calculation Result#
MassPeaks:249 BasePeak:55.05(831)



Compound Information

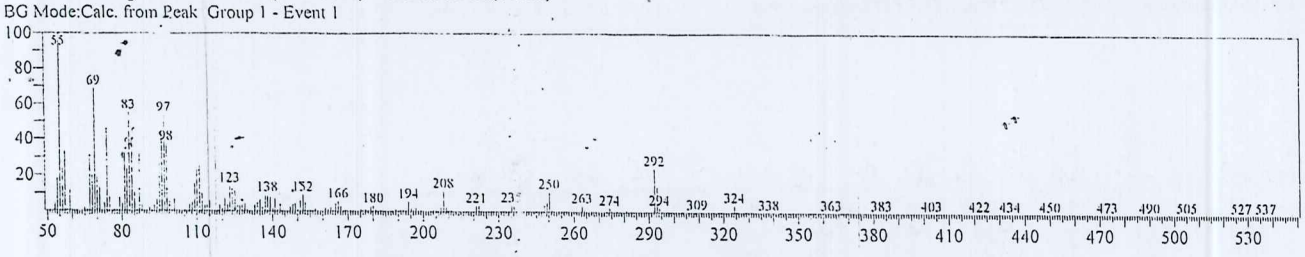
Entry:27420 Library:NIST11S.LIB
Formula:C21H40O2 CAS:3946-08-5 MolWeight:324 RetIndex:2284
CompName:11-Eicosenoic acid, methyl ester $$ Methyl (11E)-11-icosenoate # $$



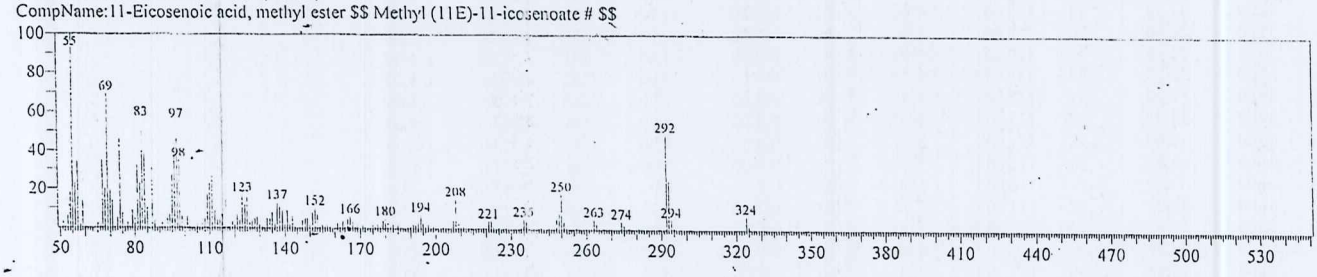
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	51.00	1.00	46	105.00	2.00	91	153.00	7.01	136	209.00	3.00
2	52.00	1.00	47	106.00	1.00	92	154.00	1.00	137	210.00	1.00
3	53.00	6.01	48	107.00	5.00	93	155.00	2.00	138	211.00	2.00
4	54.00	17.92	49	108.00	5.00	94	156.00	1.00	139	213.00	1.00
5	55.00	100.00	50	109.00	16.92	95	157.00	2.00	140	214.00	1.00
6	56.00	22.92	51	110.00	22.92	96	158.00	1.00	141	217.00	1.00
7	57.00	33.93	52	111.00	26.92	97	161.00	3.00	142	219.00	1.00
8	58.00	2.00	53	112.00	9.01	98	162.00	1.00	143	220.00	1.00
9	59.00	13.91	54	113.00	4.00	99	163.00	4.00	144	221.00	4.00
10	60.00	1.00	55	114.00	4.00	100	164.00	1.00	145	222.00	4.00
11	65.00	3.00	56	115.00	7.01	101	165.00	5.00	146	223.00	1.00
12	66.00	2.00	57	116.00	1.00	102	166.00	6.01	147	225.00	1.00
13	67.00	34.93	58	117.00	1.00	103	167.00	4.00	148	227.00	1.00
14	68.00	19.92	59	118.00	1.00	104	168.00	1.00	149	228.00	1.00
15	69.00	68.97	60	119.00	4.00	105	169.00	2.00	150	234.00	1.00
16	70.00	18.92	61	120.00	2.00	106	171.00	2.00	151	235.00	5.00
17	71.00	13.91	62	121.00	7.01	107	172.00	1.00	152	236.00	4.00
18	72.00	1.00	63	122.00	4.00	108	175.00	2.00	153	237.00	1.00
19	73.00	5.00	64	123.00	16.92	109	176.00	1.00	154	239.00	1.00
20	74.00	46.94	65	124.00	11.91	110	177.00	2.00	155	241.00	1.00
21	75.00	8.01	66	125.00	15.91	111	178.00	1.00	156	242.00	1.00
22	76.00	1.00	67	126.00	3.00	112	179.00	4.00	157	245.00	1.00
23	77.00	3.00	68	127.00	4.00	113	180.00	5.00	158	248.00	5.00
24	78.00	1.00	69	128.00	5.00	114	181.00	3.00	159	249.00	8.01
25	79.00	9.01	70	129.00	6.01	115	182.00	1.00	160	250.00	17.92
26	80.00	5.00	71	130.00	2.00	116	183.00	2.00	161	251.00	4.00
27	81.00	31.93	72	131.00	1.00	117	185.00	2.00	162	252.00	1.00
28	82.00	22.92	73	133.00	5.00	118	186.00	1.00	163	256.00	1.00
29	83.00	55.96	74	134.00	5.00	119	189.00	1.00	164	263.00	5.00
30	84.00	37.93	75	135.00	8.01	120	190.00	1.00	165	264.00	3.00
31	85.00	10.91	76	136.00	3.00	121	191.00	2.00	166	265.00	1.00
32	87.00	32.93	77	137.00	12.91	122	192.00	2.00	167	267.00	1.00
33	88.00	4.00	78	138.00	10.91	123	193.00	3.00	168	274.00	4.00
34	91.00	3.00	79	139.00	9.01	124	194.00	7.01	169	275.00	2.00
35	92.00	1.00	80	140.00	2.00	125	195.00	3.00	170	277.00	1.00
36	93.00	6.01	81	141.00	9.01	126	196.00	1.00	171	281.00	1.00
37	94.00	7.01	82	142.00	2.00	127	197.00	2.00	172	292.00	48.94
38	95.00	27.93	83	143.00	6.01	128	198.00	1.00	173	293.00	24.92
39	96.00	43.94	84	144.00	1.00	129	199.00	1.00	174	294.00	5.00
40	97.00	54.96	85	147.00	4.00	130	203.00	1.00	175	295.00	1.00
41	98.00	34.93	86	148.00	5.00	131	204.00	1.00	176	324.00	7.01
42	99.00	6.01	87	149.00	5.00	132	205.00	1.00	177	325.00	2.00
43	100.00	1.00	88	150.00	2.00	133	206.00	1.00			
44	101.00	6.01	89	151.00	8.01	134	207.00	4.00			
45	102.00	1.00	90	152.00	10.01	135	208.00	14.91			

Spectrum Comparison

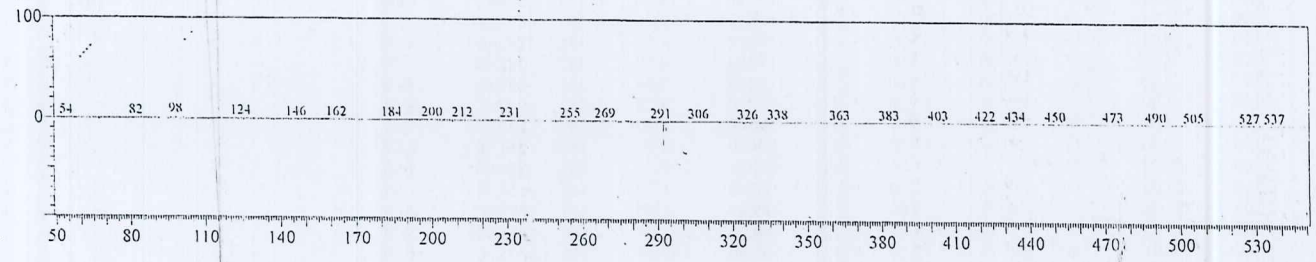
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:19.630(Scan#:3327)
MassPeaks:361
RawMode:Averaged 19.625-19.635(3326-3328) BasePeak:55.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11s.lib Entry:27420 Formula:C21H40O2 CAS:3946-08-5 MolWeight:324
MassPeaks:177 BasePeak:55.00(10000)
CompName:11-Eicosenoic acid, methyl ester $$ Methyl (11E)-11-icosenoate # $$

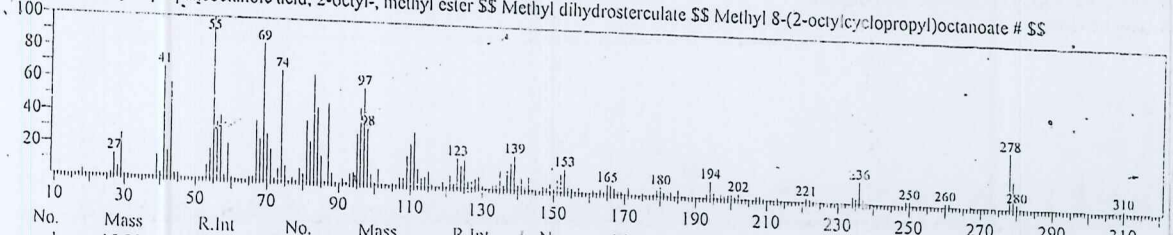


Spectrum3 #Calculation Result#
MassPeaks:332 BasePeak:84.10(312)



Compound Information

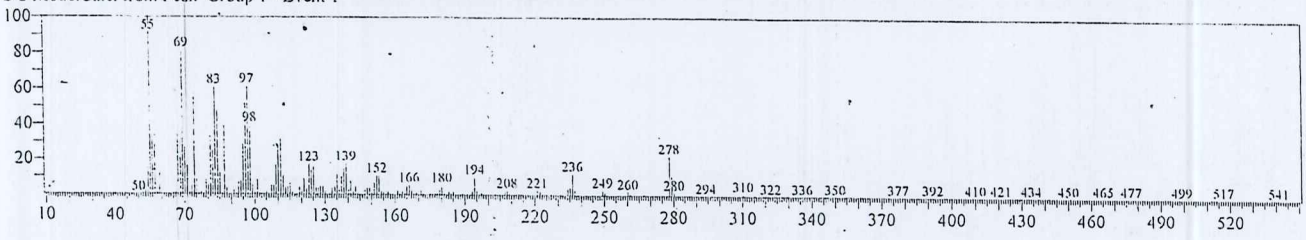
Entry:26695 Library:NIST11S.LIB
Formula:C20H38O2 CAS:10152-62-2 MolWeight:310 RetIndex:2140
CompName:Cyclopropaneoctanoic acid, 2-octyl-, methyl ester $$ Methyl dihydrosterculate $$ Methyl 8-(2-octylcyclopropyl)octanoate # $$



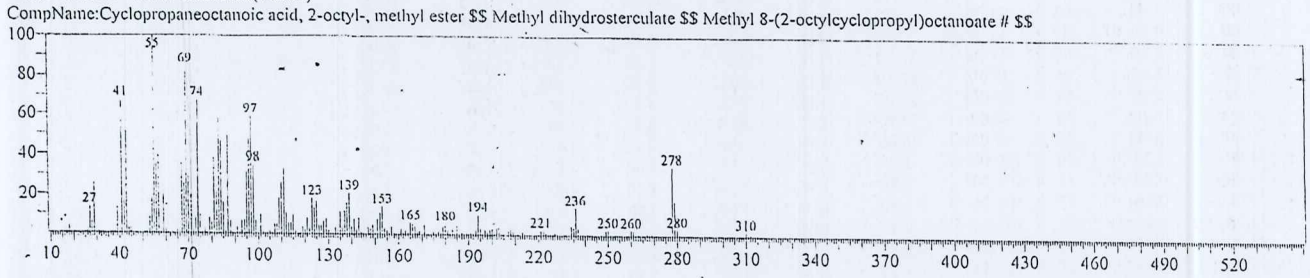
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No	Mass	R.Int
1	15.00	0.40	60	89.00	0.70	119	150.00	1.60	178	211.00	0.80
2	16.00	0.30	61	91.00	3.10	120	151.00	7.40	179	212.00	0.40
3	17.00	0.90	62	92.00	1.00	121	152.00	10.90	180	213.00	1.80
4	18.00	3.40	63	93.00	6.50	122	153.00	14.30	181	214.00	0.70
5	25.00	0.40	64	94.00	7.20	123	154.00	3.00	182	217.00	0.40
6	26.00	2.10	65	95.00	31.20	124	155.00	2.50	183	218.00	0.30
7	27.00	13.60	66	96.00	47.10	125	156.00	0.90	184	219.00	0.40
8	28.00	5.90	67	97.00	58.91	126	157.00	3.70	185	220.00	0.40
9	29.00	27.00	68	98.00	34.70	127	158.00	0.90	186	221.00	2.40
10	30.00	0.90	69	99.00	6.60	128	159.00	0.40	187	222.00	1.90
11	31.00	1.20	70	100.00	1.70	129	161.00	2.60	188	223.00	1.10
12	32.00	0.20	71	101.00	9.70	130	162.00	1.20	189	224.00	0.50
13	33.00	0.20	72	102.00	1.30	131	163.00	2.50	190	225.00	0.60
14	37.00	0.40	73	103.00	0.40	132	164.00	1.20	191	226.00	0.20
15	38.00	0.70	74	104.00	0.30	133	165.00	5.80	192	227.00	1.40
16	39.00	13.40	75	105.00	2.10	134	166.00	5.50	193	228.00	0.70
17	40.00	2.90	76	106.00	1.00	135	167.00	4.10	194	231.00	0.40
18	41.00	67.91	77	107.00	5.00	136	168.00	1.80	195	232.00	0.30
19	42.00	16.20	78	108.00	4.80	137	169.00	2.00	196	234.00	4.40
20	43.00	58.21	79	109.00	18.50	138	170.00	0.70	197	235.00	3.70
21	44.00	2.60	80	110.00	26.30	139	171.00	4.90	198	236.00	13.90
22	45.00	2.80	81	111.00	33.30	140	172.00	0.90	199	237.00	3.40
23	50.00	0.50	82	112.00	10.90	141	173.00	0.40	200	238.00	1.00
24	51.00	1.00	83	113.00	5.30	142	175.00	1.70	201	239.00	0.60
25	52.00	0.80	84	114.00	5.70	143	176.00	0.60	202	241.00	0.80
26	53.00	8.20	85	115.00	9.70	144	177.00	1.50	203	242.00	0.60
27	54.00	18.50	86	116.00	1.80	145	178.00	1.40	204	249.00	2.40
28	55.00	100.00	87	117.00	0.40	146	179.00	3.80	205	250.00	2.60
29	56.00	35.30	88	118.00	0.30	147	180.00	5.60	206	251.00	0.60
30	57.00	39.50	89	119.00	3.80	148	181.00	2.70	207	253.00	0.80
31	58.00	2.70	90	120.00	1.80	149	182.00	0.90	208	254.00	0.30
32	59.00	22.20	91	121.00	7.80	150	183.00	2.80	209	255.00	0.60
33	60.00	1.90	92	122.00	2.80	151	184.00	0.60	210	256.00	0.50
34	61.00	0.70	93	123.00	18.30	152	185.00	4.40	211	259.00	0.30
35	63.00	0.30	94	124.00	13.40	153	186.00	0.90	212	260.00	2.50
36	65.00	2.20	95	125.00	17.10	154	187.00	1.10	213	261.00	2.50
37	66.00	2.20	96	126.00	4.50	155	188.00	0.30	214	262.00	0.50
38	67.00	37.40	97	127.00	4.70	156	189.00	1.00	215	265.00	0.50
39	68.00	25.60	98	128.00	6.30	157	190.00	0.40	216	266.00	0.30
40	69.00	84.61	99	129.00	7.60	158	191.00	1.00	217	267.00	1.30
41	70.00	29.60	100	130.00	2.20	159	192.00	0.70	218	268.00	0.30
42	71.00	19.60	101	131.00	0.50	160	193.00	2.50	219	269.00	0.90
43	72.00	2.00	102	132.00	0.30	161	194.00	10.40	220	270.00	0.30
44	73.00	7.80	103	133.00	3.60	162	195.00	3.30	221	277.00	0.40
45	74.00	67.91	104	134.00	3.10	163	196.00	0.90	222	278.00	34.70
46	75.00	9.50	105	135.00	11.60	164	197.00	2.50	223	279.00	17.30
47	76.00	0.70	106	136.00	2.90	165	198.00	1.40	224	280.00	3.10
48	77.00	2.50	107	137.00	11.80	166	199.00	2.50	225	281.00	1.00
49	78.00	1.30	108	138.00	16.20	167	200.00	2.80	226	282.00	0.40
50	79.00	8.50	109	139.00	21.00	168	201.00	1.50	227	283.00	0.30
51	80.00	5.30	110	140.00	3.70	169	202.00	3.40	228	292.00	0.40
52	81.00	38.10	111	141.00	7.40	170	203.00	0.70	229	310.00	1.90
53	82.00	25.20	112	142.00	2.30	171	204.00	0.90	230	311.00	0.70
54	83.00	65.81	113	143.00	8.30	172	205.00	0.70	231	312.00	1.00
55	84.00	46.40	114	144.00	1.30	173	206.00	0.40	232	313.00	0.40
56	85.00	16.20	115	145.00	0.40	174	207.00	2.30	233	315.00	0.70
57	86.00	1.30	116	147.00	3.30	175	208.00	2.70			
58	87.00	49.20	117	148.00	2.50	176	209.00	1.50			
59	88.00	6.50	118	149.00	5.10	177	210.00	0.50			

Spectrum Comparison

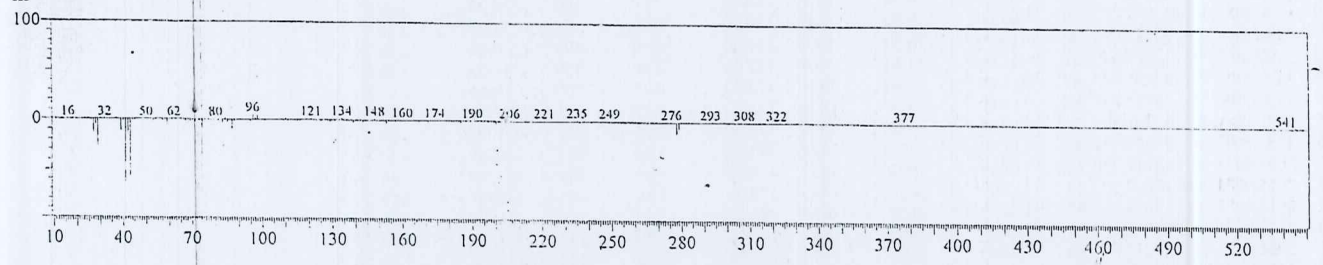
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:18.850(Scan#:3171)
MassPeaks:324
RawMode:Averaged 18.845-18.855(3170-3172) BasePeak:55.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11s.lib Entry:26695 Formula:C20H38O2 CAS:10152-62-2 MolWeight:310
MassPeaks:233 BasePeak:55.00(10000)
CompName:Cyclopropaneoctanoic acid, 2-octyl-, methyl ester $$ Methyl dihydrosterculate $$ Methyl 8-(2-octylcyclopropyl)octanoate # $$

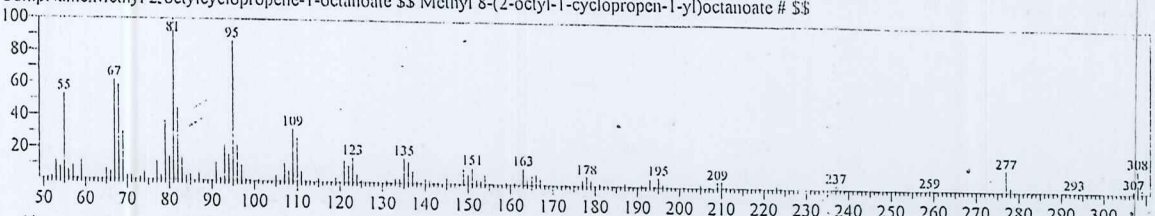


Spectrum3 #Calculation Result#
MassPeaks:261 BasePeak:98.10(486)



Compound Information

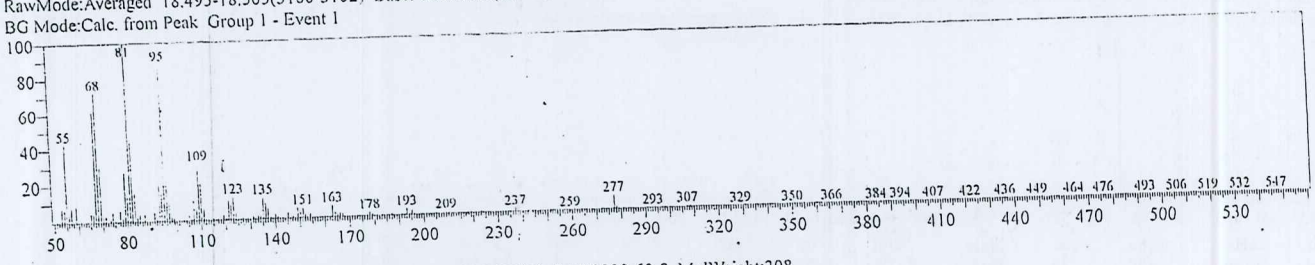
Entry:124953 Library:NIST11.LIB
Formula:C20H36O2 CAS:3220-60-8 MolWeight:308 RetIndex:2179
CompName:Methyl 2-octylcyclopropene-1-octanoate $$ Methyl 8-(2-octyl-1-cyclopropen-1-yl)octanoate # $$



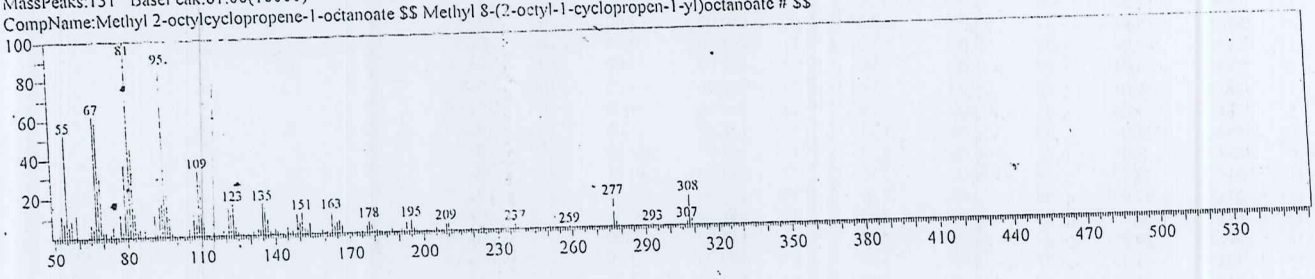
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	51.00	1.00	34	95.00	86.99	67	137.00	8.01	100	182.00	1.00
2	52.00	2.00	35	96.00	22.92	68	138.00	2.00	101	183.00	1.00
3	53.00	11.91	36	97.00	10.01	69	139.00	1.00	102	187.00	2.00
4	54.00	8.01	37	98.00	2.00	70	140.00	3.00	103	191.00	2.00
5	55.00	52.96	38	99.00	1.00	71	141.00	2.00	104	192.00	1.00
6	56.00	6.01	39	101.00	1.00	72	142.00	1.00	105	193.00	5.00
7	57.00	9.01	40	105.00	4.00	73	143.00	1.00	106	194.00	1.00
8	58.00	1.00	41	106.00	1.00	74	145.00	4.00	107	195.00	6.01
9	59.00	11.91	42	107.00	11.91	75	146.00	1.00	108	196.00	2.00
10	65.00	7.01	43	108.00	7.01	76	147.00	2.00	109	197.00	1.00
11	66.00	5.00	44	109.00	32.93	77	149.00	10.01	110	201.00	1.00
12	67.00	61.97	45	110.00	27.93	78	150.00	6.01	111	205.00	2.00
13	68.00	58.96	46	111.00	7.01	79	151.00	10.91	112	207.00	1.00
14	69.00	29.93	47	112.00	1.00	80	152.00	3.00	113	209.00	4.00
15	70.00	3.00	48	113.00	1.00	81	153.00	2.00	114	210.00	4.00
16	71.00	3.00	49	115.00	2.00	82	154.00	6.01	115	211.00	1.00
17	73.00	2.00	50	117.00	1.00	83	155.00	1.00	116	219.00	1.00
18	74.00	6.01	51	118.00	1.00	84	159.00	2.00	117	223.00	2.00
19	75.00	1.00	52	119.00	3.00	85	160.00	1.00	118	224.00	1.00
20	77.00	11.91	53	120.00	1.00	86	161.00	2.00	119	234.00	1.00
21	78.00	3.00	54	121.00	13.91	87	163.00	10.91	120	237.00	3.00
22	79.00	36.93	55	122.00	10.91	88	164.00	4.00	121	238.00	1.00
23	80.00	14.91	56	123.00	15.91	89	165.00	6.01	122	251.00	1.00
24	81.00	100.00	57	124.00	5.00	90	166.00	7.01	123	259.00	1.00
25	82.00	44.94	58	125.00	2.00	91	167.00	4.00	124	276.00	1.00
26	83.00	15.91	59	126.00	1.00	92	168.00	1.00	125	277.00	13.91
27	84.00	3.00	60	127.00	1.00	93	173.00	1.00	126	278.00	3.00
28	85.00	4.00	61	129.00	1.00	94	175.00	1.00	127	279.00	1.00
29	87.00	5.00	62	131.00	2.00	95	177.00	4.00	128	293.00	1.00
30	91.00	11.91	63	133.00	3.00	96	178.00	6.01	129	307.00	2.00
31	92.00	2.00	64	134.00	3.00	97	179.00	4.00	130	308.00	14.91
32	93.00	22.92	65	135.00	15.91	98	180.00	1.00	131	309.00	3.00
33	94.00	16.92	66	136.00	13.91	99	181.00	2.00			

Spectrum Comparison

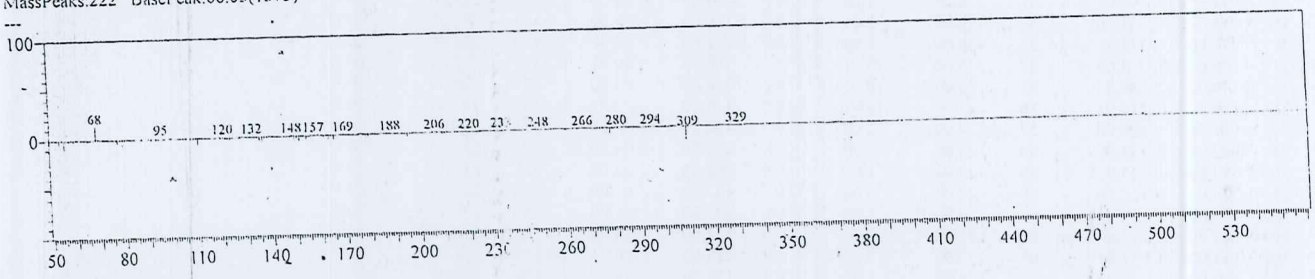
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:18.500(Scan#:3101)
MassPeaks:337
RawMode:Averaged 18.495-18.505(3100-3102) BasePeak:81.10(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:124953 Formula:C20H36O2 CAS:3220-60-8 MolWeight:308
MassPeaks:131 BasePeak:81.00(10000)
CompName:Methyl 2-octylcyclopropene-1-octanoate $$ Methyl 8-(2-octyl-1-cyclopropen-1-yl)octanoate # $$

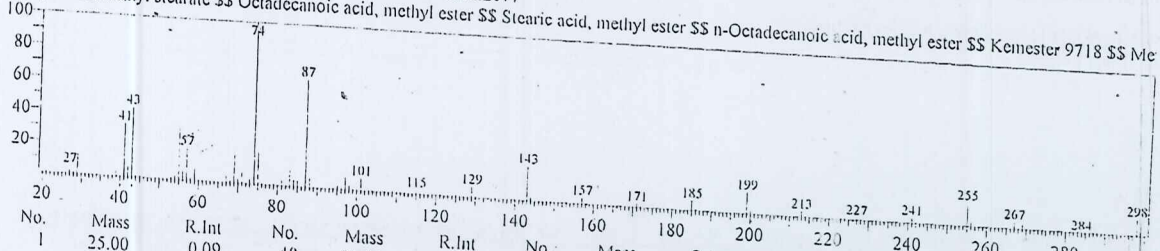


Spectrum3 #Calculation Result#
MassPeaks:222 BasePeak:68.05(1375)



Compound Information

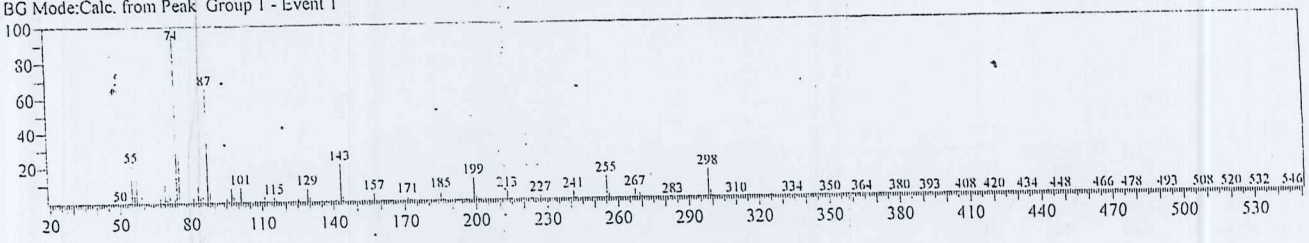
Entry:26031 Library:NIST11S.LIB
Formula:C19H38O2 CAS:112-61-8 MolWeight:298 RetIndex:2077
CompName:Methyl stearate $$ Octadecanoic acid, methyl ester $$ Stearic acid, methyl ester $$ n-Octadecanoic acid, methyl ester $$ Kemester 9718 $$ Me



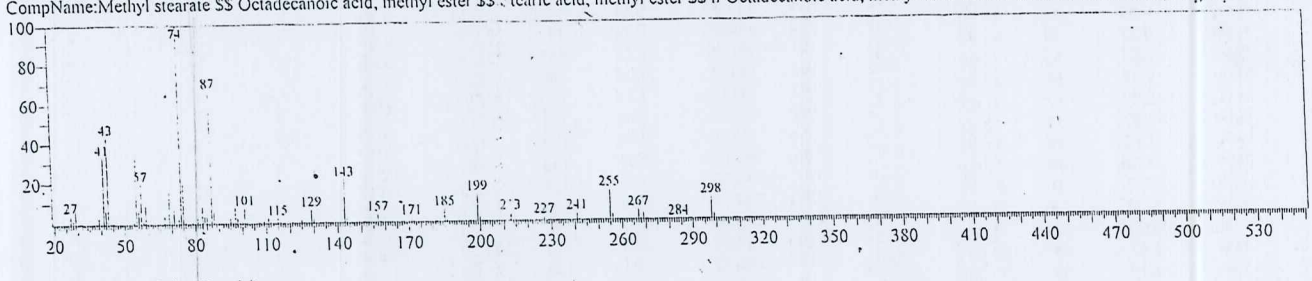
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	25.00	0.09	48	81.00	3.24	95	134.00	0.07	142	196.00	0.27
2	26.00	0.15	49	82.00	1.24	96	135.00	0.76	143	197.00	0.11
3	27.00	4.59	50	83.00	10.42	97	137.00	0.44	144	199.00	13.34
4	28.00	1.93	51	84.00	4.10	98	138.00	0.27	145	200.00	1.94
5	29.00	12.72	52	85.00	3.88	99	139.00	0.67	146	201.00	0.37
6	30.00	0.39	53	86.00	0.29	100	140.00	0.21	147	204.00	0.07
7	31.00	0.73	54	87.00	66.63	101	141.00	0.28	148	205.00	0.03
8	32.00	0.02	55	88.00	5.89	102	143.00	21.04	149	208.00	0.18
9	33.00	0.33	56	89.00	0.53	103	144.00	2.31	150	209.00	0.04
10	36.00	0.09	57	91.00	0.09	104	145.00	0.26	151	213.00	3.68
11	38.00	0.02	58	92.00	0.21	105	146.00	0.08	152	214.00	0.75
12	39.00	3.17	59	93.00	0.77	106	147.00	0.05	153	215.00	0.16
13	40.00	0.76	60	94.00	0.51	107	148.00	0.16	154	217.00	0.04
14	41.00	33.12	61	95.00	2.55	108	149.00	0.46	155	219.00	0.09
15	42.00	6.34	62	96.00	1.71	109	150.00	0.07	156	221.00	0.09
16	43.00	43.29	63	97.00	7.90	110	151.00	0.23	157	222.00	0.21
17	44.00	1.43	64	98.00	2.90	111	152.00	0.01	158	223.00	0.18
18	45.00	1.19	65	99.00	0.82	112	153.00	0.36	159	227.00	1.61
19	51.00	0.05	66	100.00	0.46	113	154.00	0.25	160	228.00	0.36
20	52.00	0.20	67	101.00	7.53	114	155.00	0.07	161	233.00	0.03
21	53.00	1.38	68	102.00	0.81	115	156.00	0.06	162	237.00	0.15
22	54.00	2.65	69	103.00	0.09	116	157.00	3.77	163	241.00	3.43
23	55.00	32.55	70	107.00	0.66	117	158.00	0.57	164	242.00	0.58
24	56.00	6.22	71	108.00	0.38	118	159.00	0.11	165	246.00	0.05
25	57.00	19.60	72	109.00	1.41	119	163.00	0.28	166	247.00	0.09
26	58.00	1.38	73	110.00	0.52	120	164.00	0.05	167	249.00	0.05
27	59.00	9.14	74	111.00	2.80	121	165.00	0.18	168	251.00	0.04
28	60.00	0.12	75	112.00	0.98	122	166.00	0.08	169	253.00	0.14
29	61.00	0.31	76	113.00	0.63	123	167.00	0.32	170	255.00	14.68
30	62.00	0.06	77	114.00	0.08	124	168.00	0.08	171	256.00	2.69
31	63.00	0.05	78	115.00	2.38	125	170.00	0.09	172	257.00	0.31
32	65.00	0.49	79	116.00	0.85	126	171.00	2.00	173	258.00	0.04
33	66.00	0.09	80	117.00	0.16	127	172.00	0.57	174	264.00	0.27
34	67.00	4.30	81	118.00	0.06	128	175.00	0.07	175	265.00	0.14
35	68.00	1.76	82	119.00	0.12	129	177.00	0.19	176	266.00	0.07
36	69.00	17.02	83	121.00	0.91	130	179.00	0.05	177	267.00	4.63
37	70.00	2.79	84	122.00	0.25	131	180.00	0.06	178	268.00	0.95
38	71.00	7.10	85	123.00	0.67	132	181.00	0.19	179	269.00	3.03
39	72.00	0.44	86	124.00	0.35	133	182.00	0.12	180	270.00	0.68
40	73.00	2.96	87	125.00	1.74	134	183.00	0.06	181	283.00	0.06
41	74.00	100.00	88	126.00	0.46	135	185.00	5.99	182	284.00	0.07
42	75.00	19.43	89	127.00	0.41	136	186.00	1.29	183	298.00	10.37
43	76.00	1.07	90	128.00	0.12	137	187.00	0.23	184	299.00	2.55
44	77.00	0.23	91	129.00	6.45	138	189.00	0.05	185	300.00	0.18
45	78.00	0.21	92	130.00	1.90	139	191.00	0.18			
46	79.00	1.45	93	131.00	0.11	140	194.00	0.11			
47	80.00	0.30	94	133.00	0.01	141	195.00	0.04			

Spectrum Comparison

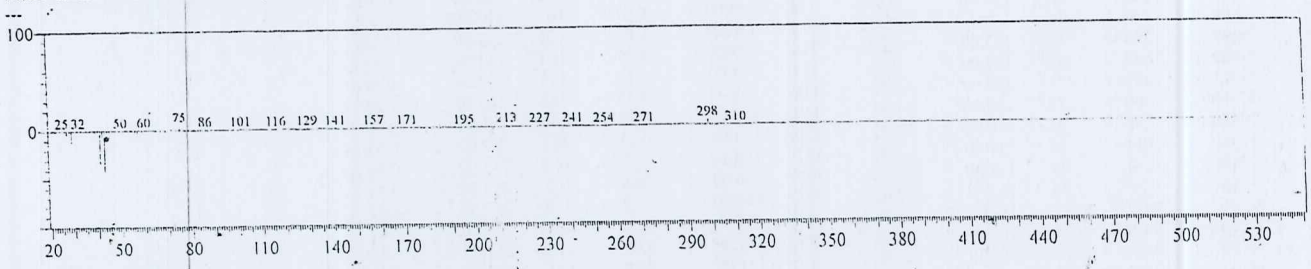
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:18.080(Scan#:3017)
MassPeaks:303
RawMode:Averaged 18.075-18.085(3016-3018) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11s.lib Entry:26031 Formula:C19H38O2 CAS:112-61-8 MolWeight:298
MassPeaks:185 BasePeak:74.00(10000)
CompName:Methyl stearate $$ Octadecanoic acid, methyl ester $$ Stearic acid, methyl ester $$ n-Octadecanoic acid, methyl ester $$ Kemester 9718 $$ Methyl n-octadecanoate

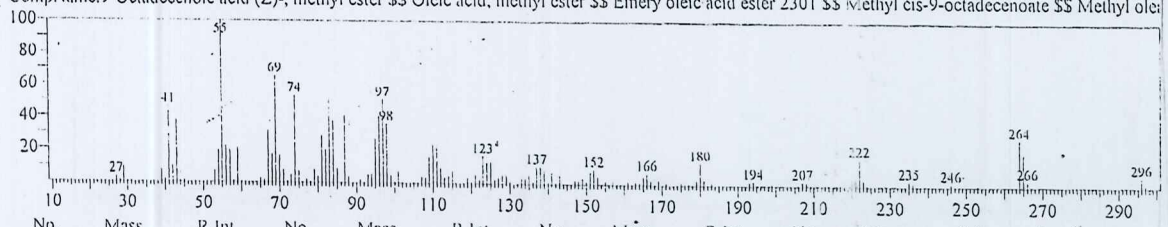


Spectrum3 #Calculation Result#
MassPeaks:230 BasePeak:298.30(538)



Compound Information

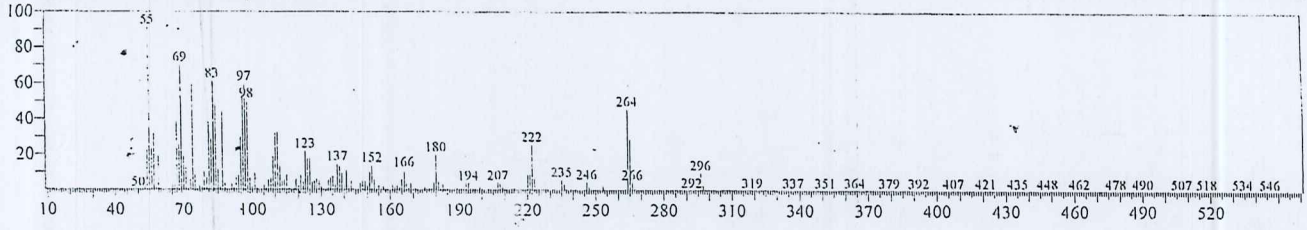
Entry:115420 Library:NIST11.LIB
Formula:C19H36O2 CAS:112-62-9 MolWeight:296 RetIndex:2085
CompName:9-Octadecenoic acid (Z)-, methyl ester $$ Oleic acid, methyl ester $$ Emery oleic acid ester 2301 $$ Methyl cis-9-octadecenoate $$ Methyl ole



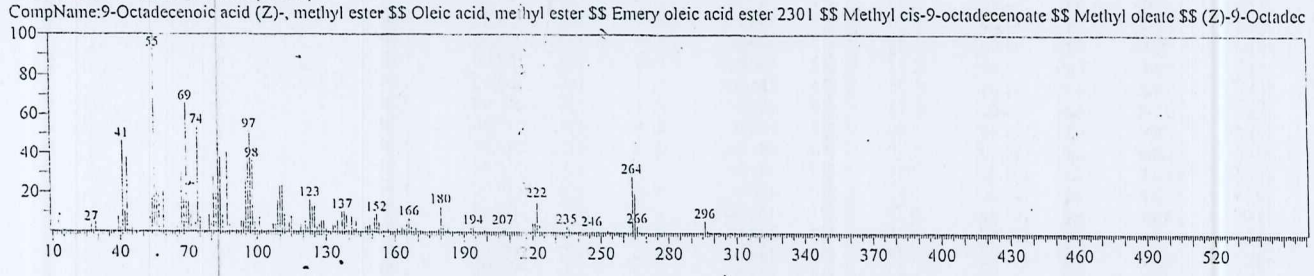
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	15.00	0.70	55	91.00	2.50	109	145.00	0.20	163	203.00	0.50
2	26.00	0.20	56	92.00	0.70	110	146.00	0.10	164	204.00	0.20
3	27.00	3.50	57	93.00	5.30	111	147.00	2.60	165	205.00	0.20
4	28.00	1.00	58	94.00	5.50	112	148.00	2.90	166	206.00	0.20
5	29.00	9.01	59	95.00	26.92	113	149.00	3.80	167	207.00	2.40
6	30.00	0.30	60	96.00	43.64	114	150.00	1.60	168	208.00	1.80
7	31.00	0.40	61	97.00	51.26	115	151.00	7.31	169	209.00	0.90
8	33.00	0.10	62	98.00	36.13	116	152.00	8.91	170	210.00	0.30
9	39.00	7.61	63	99.00	5.00	117	153.00	4.70	171	211.00	0.20
10	40.00	1.80	64	100.00	1.10	118	154.00	0.80	172	212.00	0.10
11	41.00	46.34	65	101.00	7.51	119	155.00	1.90	173	213.00	1.10
12	42.00	10.31	66	102.00	0.90	120	156.00	0.40	174	214.00	0.70
13	43.00	37.93	67	103.00	0.20	121	157.00	1.80	175	215.00	0.10
14	44.00	1.40	68	104.00	0.10	122	158.00	0.40	176	217.00	0.30
15	45.00	1.90	69	105.00	1.30	123	159.00	0.10	177	218.00	0.10
16	50.00	0.10	70	106.00	0.60	124	161.00	2.00	178	220.00	4.90
17	51.00	0.60	71	107.00	4.00	125	162.00	1.00	179	221.00	4.70
18	52.00	0.50	72	108.00	3.90	126	163.00	2.10	180	222.00	16.41
19	53.00	7.71	73	109.00	15.71	127	164.00	1.50	181	223.00	3.60
20	54.00	20.02	74	110.00	23.42	128	165.00	4.70	182	224.00	0.40
21	55.00	100.00	75	111.00	23.92	129	166.00	6.81	183	225.00	0.20
22	56.00	21.92	76	112.00	8.91	130	167.00	2.90	184	227.00	0.40
23	57.00	19.52	77	113.00	3.90	131	168.00	0.60	185	228.00	0.40
24	58.00	1.20	78	114.00	4.70	132	169.00	2.80	186	229.00	0.10
25	59.00	20.82	79	115.00	7.71	133	170.00	0.50	187	231.00	0.10
26	60.00	0.70	80	116.00	1.20	134	171.00	1.20	188	233.00	0.10
27	61.00	0.20	81	117.00	0.20	135	172.00	0.30	189	235.00	3.00
28	62.00	0.10	82	118.00	0.30	136	173.00	0.10	190	236.00	1.90
29	63.00	0.10	83	119.00	3.60	137	175.00	1.70	191	237.00	0.30
30	64.00	0.10	84	120.00	1.40	138	176.00	0.50	192	239.00	0.20
31	65.00	2.70	85	121.00	5.81	139	177.00	1.10	193	240.00	0.10
32	66.00	2.00	86	122.00	2.50	140	178.00	0.60	194	241.00	0.20
33	67.00	31.73	87	123.00	16.41	141	179.00	2.80	195	245.00	0.20
34	68.00	17.12	88	124.00	12.71	142	180.00	13.01	196	246.00	1.80
35	69.00	65.67	89	125.00	13.31	143	181.00	3.30	197	247.00	0.80
36	70.00	16.11	90	126.00	2.80	144	182.00	0.60	198	248.00	0.10
37	71.00	8.61	91	127.00	3.90	145	183.00	1.90	199	249.00	0.50
38	72.00	1.00	92	128.00	5.50	146	184.00	0.30	200	250.00	0.10
39	73.00	5.10	93	129.00	5.71	147	185.00	0.90	201	253.00	1.20
40	74.00	53.56	94	130.00	1.60	148	186.00	0.30	202	254.00	0.20
41	75.00	7.31	95	131.00	0.30	149	187.00	0.10	203	255.00	0.10
42	76.00	0.50	96	132.00	0.20	150	189.00	1.00	204	264.00	28.73
43	77.00	2.50	97	133.00	3.50	151	190.00	0.30	205	265.00	19.42
44	78.00	0.90	98	134.00	3.40	152	191.00	0.50	206	266.00	3.40
45	79.00	8.51	99	135.00	5.50	153	192.00	0.30	207	267.00	0.60
46	80.00	4.10	100	136.00	1.80	154	193.00	2.30	208	268.00	0.10
47	81.00	28.43	101	137.00	10.21	155	194.00	2.40	209	278.00	0.40
48	82.00	19.72	102	138.00	10.21	156	195.00	0.90	210	279.00	0.10
49	83.00	51.66	103	139.00	8.31	157	196.00	0.30	211	294.00	0.10
50	84.00	37.93	104	140.00	1.40	158	197.00	0.50	212	296.00	6.01
51	85.00	8.81	105	141.00	7.71	159	198.00	0.10	213	297.00	1.50
52	87.00	42.14	106	142.00	1.50	160	199.00	1.30	214	298.00	0.20
53	88.00	3.90	107	143.00	5.30	161	200.00	0.70			
54	89.00	0.30	108	144.00	0.80	162	201.00	0.10			

Spectrum Comparison

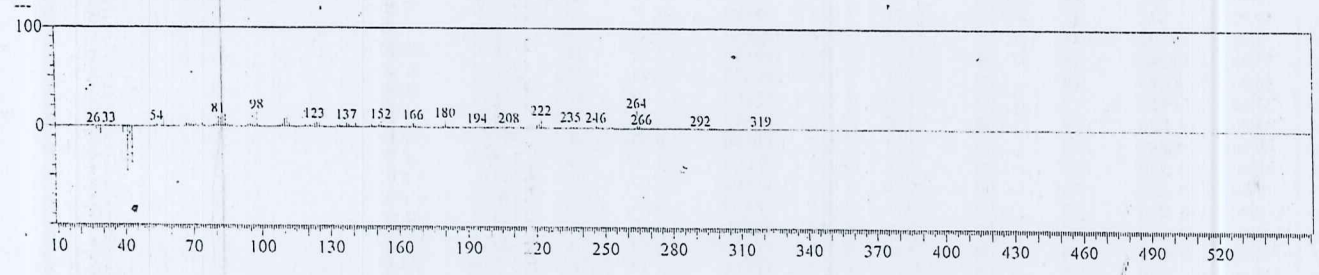
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:17.920(Scan#:2985)
MassPeaks:322
RawMode:Averaged 17.915-17.925(2984-2986) BasePeak:55.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:115420 Formula:C19H36O2 CAS:112-62-9 MolWeight:296
MassPeaks:214 BasePeak:55.00(10000)
CompName:9-Octadecenoic acid (Z)-, methyl ester $$ Oleic acid, methyl ester $$ Emery oleic acid ester 2301 $$ Methyl cis-9-octadecenoate $$ Methyl oleate $$ (Z)-9-Octadec

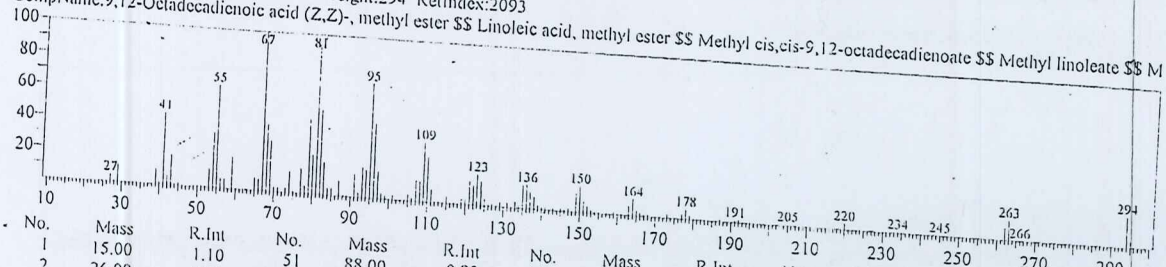


Spectrum3 #Calculation Result#
MassPeaks:244 BasePeak:264.25(1721)



Compound Information

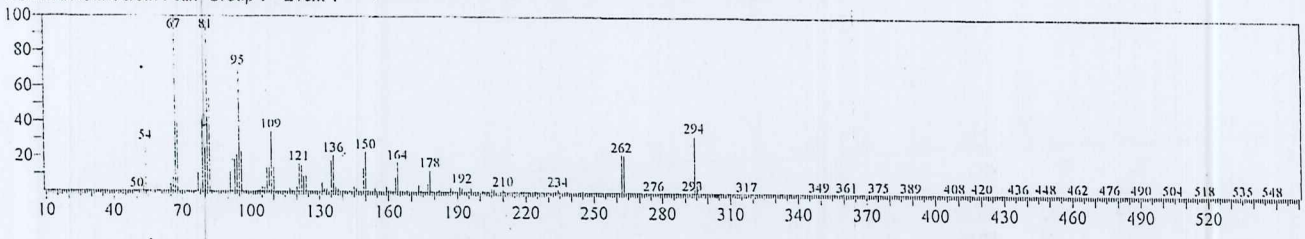
Entry:113951 Library:NIST11.LIB
Formula:C19H34O2 CAS:112-63-0 MolWeight:294 RetIndex:2093
CompName:9,12-Octadecadienoic acid (Z,Z)-, methyl ester $$ Linoleic acid, methyl ester $$ Methyl cis,cis-9,12-octadecadienoate $$ Methyl linoleate $$ M



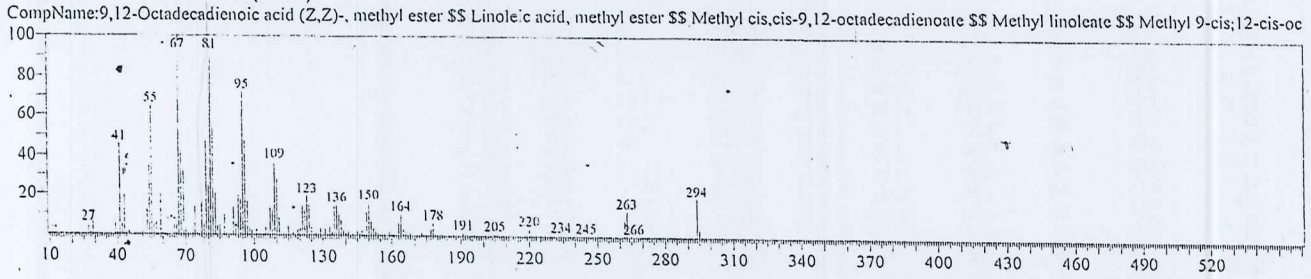
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	15.00	1.10	51	88.00	0.90	101	139.00	2.60	151	192.00	1.70
2	26.00	0.20	52	89.00	0.50	102	140.00	1.70	152	193.00	0.80
3	27.00	4.70	53	91.00	14.21	103	141.00	2.10	153	194.00	0.30
4	28.00	1.40	54	92.00	2.90	104	142.00	0.40	154	195.00	0.90
5	29.00	11.31	55	93.00	19.42	105	143.00	1.70	155	196.00	0.90
6	30.00	0.30	56	94.00	17.32	106	144.00	0.30	156	197.00	0.20
7	31.00	0.50	57	95.00	72.07	107	145.00	2.10	157	199.00	0.10
8	33.00	0.10	58	96.00	47.24	108	146.00	1.20	158	201.00	0.50
9	37.00	0.10	59	97.00	16.51	109	147.00	2.40	159	202.00	0.10
10	39.00	9.71	60	98.00	3.60	110	148.00	0.90	160	203.00	0.10
11	40.00	2.00	61	99.00	2.40	111	149.00	11.21	161	205.00	1.10
12	41.00	45.64	62	100.00	0.50	112	150.00	16.01	162	206.00	0.90
13	42.00	6.21	63	101.00	2.90	113	151.00	7.11	163	207.00	0.30
14	43.00	19.42	64	102.00	0.30	114	152.00	4.20	164	208.00	0.20
15	44.00	0.80	65	103.00	0.60	115	153.00	2.00	165	209.00	0.70
16	45.00	2.10	66	104.00	0.70	116	154.00	1.80	166	210.00	0.70
17	50.00	0.20	67	105.00	4.00	117	155.00	0.90	167	211.00	0.10
18	51.00	1.40	68	106.00	2.20	118	156.00	0.10	168	213.00	0.10
19	52.00	1.30	69	107.00	12.91	119	157.00	0.80	169	215.00	0.20
20	53.00	11.91	70	108.00	12.71	120	158.00	0.10	170	216.00	0.10
21	54.00	34.93	71	109.00	37.23	121	159.00	1.90	171	218.00	0.50
22	55.00	65.07	72	110.00	28.03	122	160.00	0.60	172	219.00	0.70
23	56.00	6.21	73	111.00	8.31	123	161.00	1.10	173	220.00	3.80
24	57.00	6.31	74	112.00	1.10	124	162.00	0.40	174	221.00	0.80
25	59.00	20.02	75	113.00	1.30	125	163.00	6.11	175	223.00	0.50
26	60.00	0.60	76	114.00	0.70	126	164.00	10.31	176	224.00	0.50
27	61.00	0.20	77	115.00	4.40	127	165.00	3.70	177	225.00	0.10
28	62.00	0.10	78	116.00	0.50	128	166.00	2.10	178	227.00	0.10
29	63.00	0.30	79	117.00	1.40	129	167.00	1.50	179	233.00	0.40
30	65.00	8.21	80	118.00	0.70	130	168.00	1.40	180	234.00	0.80
31	66.00	7.51	81	119.00	3.30	131	169.00	0.40	181	235.00	0.20
32	67.00	100.00	82	120.00	3.30	132	170.00	0.10	182	237.00	0.40
33	68.00	42.34	83	121.00	14.61	133	171.00	0.50	183	238.00	0.30
34	69.00	32.13	84	122.00	12.21	134	172.00	0.10	184	239.00	0.10
35	70.00	3.10	85	123.00	19.32	135	173.00	2.40	185	244.00	0.10
36	71.00	2.80	86	124.00	14.71	136	174.00	0.60	186	245.00	0.40
37	72.00	0.30	87	125.00	4.50	137	175.00	0.60	187	246.00	0.10
38	73.00	3.10	88	126.00	0.90	138	176.00	0.20	188	247.00	0.10
39	74.00	13.71	89	127.00	1.60	139	177.00	3.20	189	251.00	0.30
40	75.00	1.30	90	128.00	0.90	140	178.00	6.11	190	252.00	0.20
41	77.00	15.81	91	129.00	3.20	141	179.00	2.20	191	262.00	7.81
42	78.00	4.80	92	130.00	0.40	142	180.00	0.90	192	263.00	12.31
43	79.00	47.44	93	131.00	3.10	143	181.00	1.30	193	264.00	2.30
44	80.00	24.72	94	132.00	1.10	144	182.00	0.90	194	265.00	0.50
45	81.00	95.70	95	133.00	4.00	145	183.00	0.20	195	266.00	0.10
46	82.00	53.46	96	134.00	1.80	146	185.00	0.20	196	279.00	0.10
47	83.00	20.82	97	135.00	14.51	147	187.00	1.50	197	294.00	18.92
48	84.00	4.30	98	136.00	14.71	148	188.00	0.30	198	295.00	4.00
49	85.00	4.70	99	137.00	10.41	149	189.00	0.30	199	296.00	0.50
50	87.00	9.71	100	138.00	7.61	150	191.00	1.70			

Spectrum Comparison

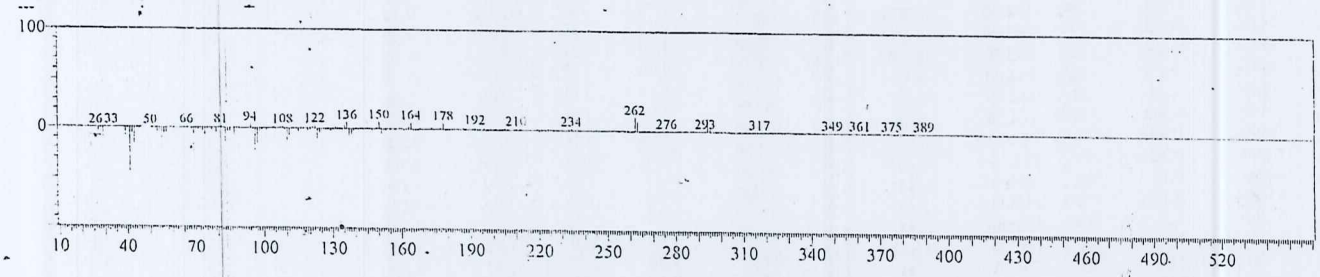
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:17.855(Scan#:2972)
MassPeaks:248
RawMode:Averaged 17.850-17.860(2971-2973) BasePeak:67.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:113951 Formula:C19H34O2 CAS:112-63-0 MolWeight:294
MassPeaks:199 BasePeak:67.00(10000)
CompName:9,12-Octadecadienoic acid (Z,Z)-, methyl ester $$ Linoleic acid, methyl ester $$ Methyl cis,cis-9,12-octadecadienoate $$ Methyl linoleate $$ Methyl 9-cis;12-cis-oc

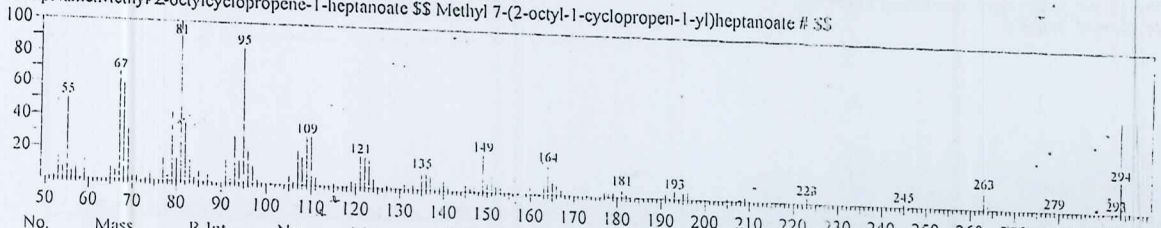


Spectrum3 #Calculation Result#
MassPeaks:213 BasePeak:294.25(1427)



Compound Information

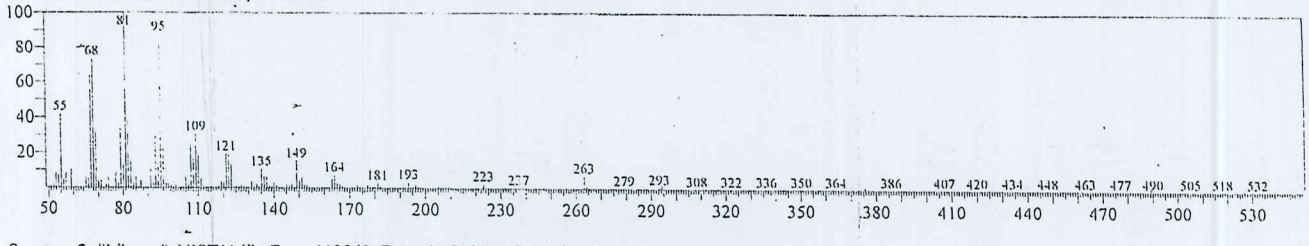
Entry:113963 Library:NIST11.LIB
Formula:C19H34O2 CAS:5026-66-4 MolWeight:294 RetIndex:2080
CompName:Methyl 2-octylcyclopropene-1-heptanoate $$ Methyl 7-(2-octyl-1-cyclopropen-1-yl)heptanoate # $$



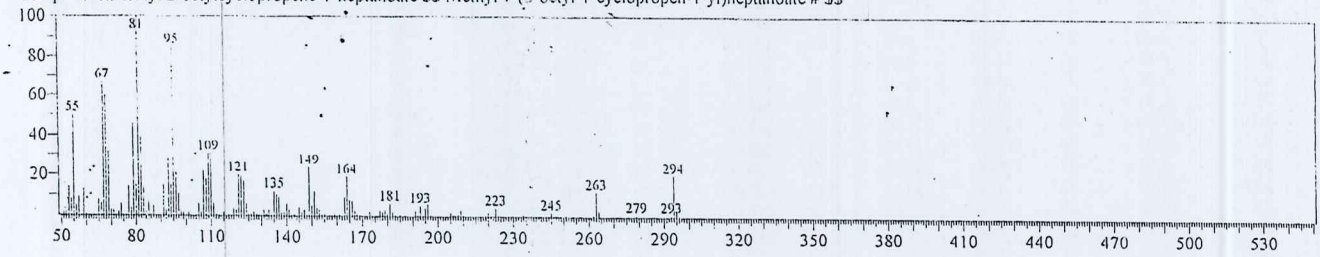
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	51.00	2.00	36	94.00	14.91	71	136.00	10.01	106	185.00	1.00
2	52.00	2.00	37	95.00	84.99	72	137.00	9.01	107	187.00	1.00
3	53.00	13.91	38	96.00	21.92	73	138.00	2.00	108	191.00	3.00
4	54.00	8.01	39	97.00	10.91	74	139.00	2.00	109	192.00	1.00
5	55.00	49.94	40	98.00	3.00	75	140.00	6.01	110	193.00	5.00
6	56.00	5.00	41	99.00	2.00	76	141.00	3.00	111	194.00	1.00
7	57.00	9.01	42	101.00	2.00	77	143.00	1.00	112	195.00	4.00
8	58.00	1.00	43	105.00	6.01	78	145.00	4.00	113	196.00	6.01
9	59.00	12.91	44	106.00	2.00	79	146.00	2.00	114	197.00	1.00
10	60.00	1.00	45	107.00	21.92	80	147.00	3.00	115	205.00	2.00
11	65.00	8.01	46	108.00	17.92	81	148.00	1.00	116	206.00	1.00
12	66.00	6.01	47	109.00	30.93	82	149.00	23.92	117	207.00	1.00
13	67.00	66.97	48	110.00	30.93	83	150.00	5.00	118	208.00	1.00
14	68.00	59.96	49	111.00	6.01	84	151.00	11.91	119	209.00	3.00
15	69.00	31.93	50	112.00	1.00	85	152.00	4.00	120	210.00	1.00
16	70.00	3.00	51	113.00	1.00	86	153.00	3.00	121	219.00	1.00
17	71.00	3.00	52	115.00	2.00	87	154.00	1.00	122	220.00	2.00
18	73.00	2.00	53	117.00	1.00	88	155.00	1.00	123	223.00	4.00
19	74.00	6.01	54	118.00	1.00	89	159.00	1.00	124	224.00	1.00
20	75.00	1.00	55	119.00	4.00	90	161.00	1.00	125	234.00	1.00
21	76.00	1.00	56	120.00	3.00	91	163.00	9.01	126	237.00	1.00
22	77.00	14.91	57	121.00	19.92	92	164.00	18.92	127	245.00	2.00
23	78.00	4.00	58	122.00	18.92	93	165.00	8.01	128	247.00	1.00
24	79.00	45.94	59	123.00	16.92	94	166.00	7.01	129	251.00	1.00
25	80.00	14.91	60	124.00	6.01	95	167.00	3.00	130	262.00	1.00
26	81.00	100.00	61	125.00	1.00	96	168.00	1.00	131	263.00	11.91
27	82.00	38.94	62	126.00	1.00	97	169.00	1.00	132	264.00	3.00
28	83.00	13.91	63	127.00	2.00	98	173.00	2.00	133	279.00	1.00
29	84.00	3.00	64	128.00	1.00	99	177.00	3.00	134	293.00	1.00
30	85.00	7.01	65	129.00	1.00	100	178.00	2.00	135	294.00	19.92
31	86.00	1.00	66	131.00	3.00	101	179.00	3.00	136	295.00	4.00
32	87.00	5.00	67	132.00	1.00	102	180.00	1.00	137	296.00	1.00
33	91.00	14.91	68	133.00	3.00	103	181.00	6.01			
34	92.00	3.00	69	134.00	1.00	104	182.00	2.00			
35	93.00	29.93	70	135.00	11.91	105	183.00	1.00			

Spectrum Comparison

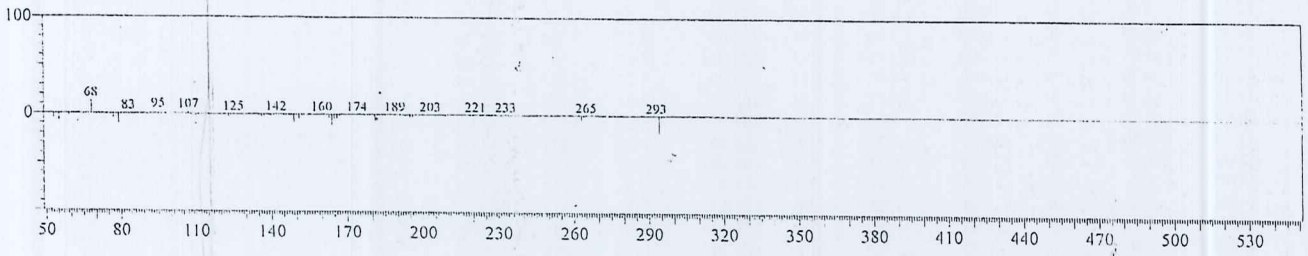
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:17.590(Scan#:2919)
MassPeaks:367
RawMode:Averaged 17.585-17.595(2918-2920) BasePeak:81.10(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:113963 Formula:C19H34O2 CAS:5026-66-4 MolWeight:294
MassPeaks:137 BasePeak:81.00(10000)
CompName:Methyl 2-octylcyclopropene-1-heptanoate $$ Methyl 7-(2-octyl-1-cyclopropen-1-yl)heptanoate # $$

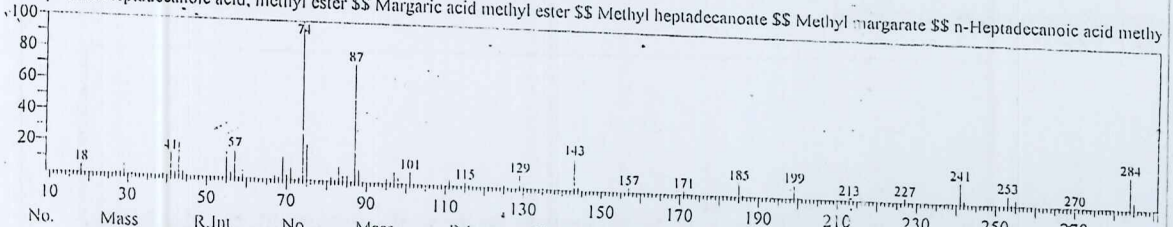


Spectrum3 #Calculation Result#
MassPeaks:216 BasePeak:68.10(1365)



Compound Information

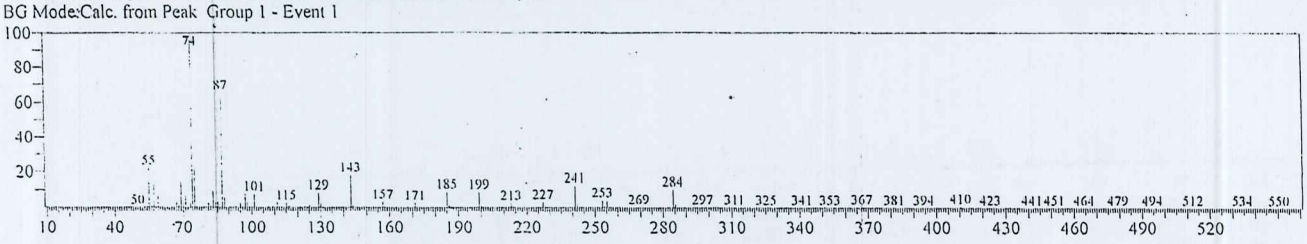
Entry:25176 Library:NIST11S.LIB
Formula:C18H36O2 CAS:1731-92-6 MolWeight:284 RetIndex:1978
CompName:Heptadecanoic acid, methyl ester $$ Margaric acid methyl ester $$ Methyl heptadecanoate $$ Methyl margarate $$ n-Heptadecanoic acid methy



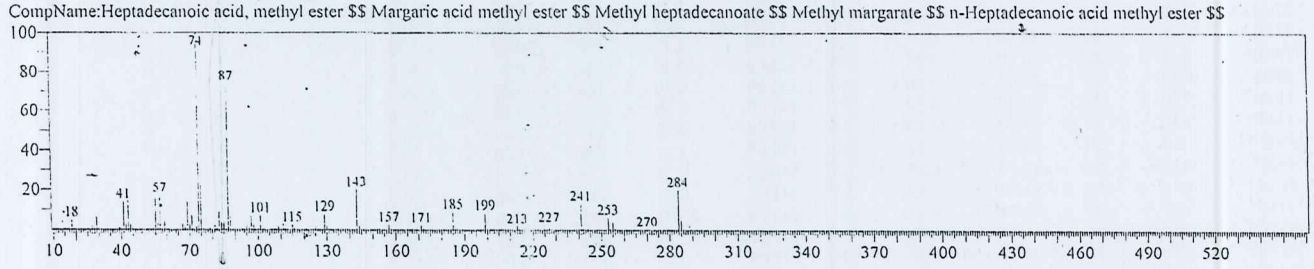
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	15.00	1.20	40	78.00	0.20	79	126.00	0.40	118	187.00	0.20
2	16.00	0.30	41	79.00	0.90	80	127.00	0.40	119	191.00	0.20
3	17.00	0.99	42	80.00	0.40	81	129.00	7.81	120	195.00	0.30
4	18.00	5.01	43	81.00	2.80	82	130.00	1.90	121	196.00	0.20
5	27.00	1.90	44	82.00	1.40	83	131.00	0.20	122	199.00	8.21
6	28.00	1.40	45	83.00	9.01	84	133.00	0.20	123	200.00	1.00
7	29.00	6.41	46	84.00	3.70	85	135.00	0.80	124	208.00	0.30
8	30.00	0.30	47	85.00	3.90	86	136.00	0.20	125	209.00	0.30
9	31.00	0.70	48	86.00	0.30	87	137.00	0.50	126	210.00	0.50
10	32.00	0.30	49	87.00	74.08	88	138.00	0.30	127	211.00	0.20
11	39.00	1.40	50	88.00	7.01	89	139.00	1.10	128	213.00	1.90
12	40.00	0.40	51	89.00	0.60	90	140.00	0.30	129	214.00	0.40
13	41.00	14.01	52	93.00	0.90	91	141.00	0.40	130	219.00	0.20
14	42.00	3.00	53	94.00	0.30	92	143.00	20.02	131	223.00	0.20
15	43.00	21.02	54	95.00	2.70	93	144.00	2.10	132	227.00	2.70
16	44.00	3.20	55	96.00	1.30	94	145.00	0.20	133	228.00	0.70
17	45.00	0.80	56	97.00	6.91	95	151.00	0.30	134	233.00	0.20
18	53.00	0.70	57	98.00	3.60	96	152.00	0.30	135	234.00	0.20
19	54.00	1.10	58	99.00	1.20	97	153.00	0.70	136	235.00	0.20
20	55.00	16.01	59	100.00	0.30	98	154.00	0.30	137	239.00	0.30
21	56.00	3.30	60	101.00	7.21	99	155.00	0.20	138	241.00	13.01
22	57.00	17.02	61	102.00	0.80	100	157.00	2.80	139	242.00	2.40
23	58.00	1.00	62	107.00	0.80	101	158.00	0.60	140	243.00	0.30
24	59.00	5.00	63	108.00	0.20	102	163.00	0.40	141	251.00	0.30
25	60.00	0.30	64	109.00	1.50	103	165.00	0.20	142	252.00	0.20
26	61.00	0.30	65	110.00	0.70	104	166.00	0.20	143	253.00	6.41
27	65.00	0.20	66	111.00	3.40	105	167.00	0.50	144	254.00	1.20
28	66.00	0.20	67	112.00	1.10	106	168.00	0.20	145	255.00	3.90
29	67.00	2.90	68	113.00	0.70	107	169.00	0.20	146	256.00	0.90
30	68.00	1.40	69	114.00	0.20	108	171.00	2.40	147	257.00	0.20
31	69.00	14.01	70	115.00	2.70	109	172.00	0.80	148	259.00	0.20
32	70.00	2.80	71	116.00	1.30	110	177.00	0.30	149	260.00	0.50
33	71.00	7.41	72	117.00	0.20	111	179.00	0.20	150	263.00	0.20
34	72.00	0.50	73	119.00	0.20	112	180.00	0.20	151	284.00	20.02
35	73.00	1.80	74	121.00	0.90	113	181.00	0.40	152	285.00	4.90
36	74.00	100.00	75	122.00	0.20	114	182.00	0.20	153	286.00	0.70
37	75.00	22.02	76	123.00	0.70	115	183.00	0.20			
38	76.00	1.10	77	124.00	0.40	116	185.00	8.71			
39	77.00	0.30	78	125.00	1.70	117	186.00	1.50			

Spectrum Comparison

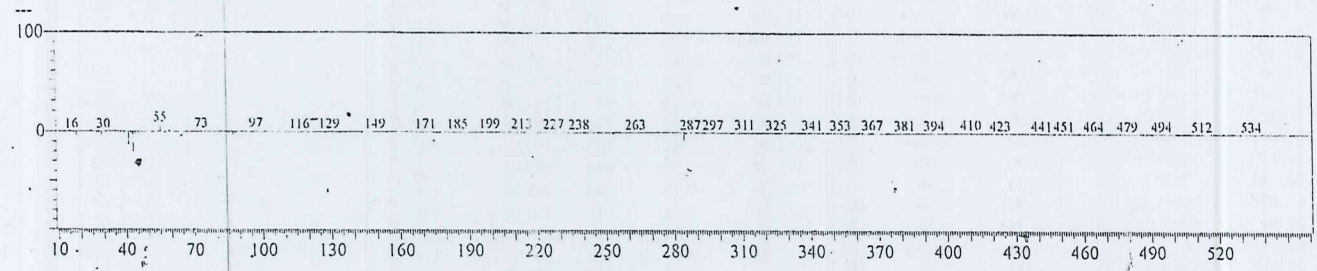
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:17.125(Scan#:2826)
MassPeaks:324
RawMode:Averaged 17.120-17.130(2825-2827) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11s.lib Entry:25176 Formula:C18H36O2 CAS:1731-92-6 MolWeight:284
MassPeaks:153 BasePeak:74.00(10000)
CompName:Heptadecanoic acid, methyl ester $$ Margaric acid methyl ester $$ Methyl heptadecanoate $$ Methyl margarate $$ n-Heptadecanoic acid methyl ester $$

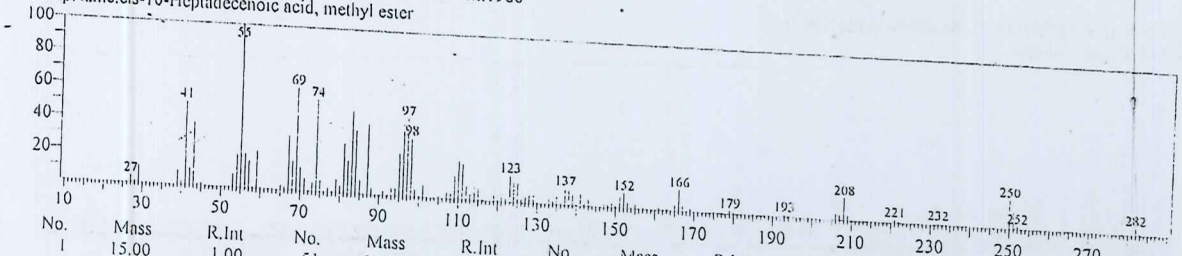


Spectrum3 #Calculation Result#
MassPeaks:281 BasePeak:55.05(621)



Compound Information

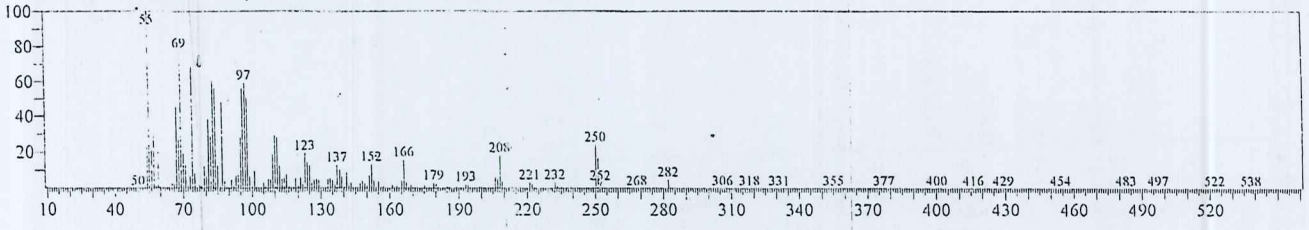
Entry:104416 Library:NIST11.LIB
Formula:C18H34O2 CAS:0-00-0 MolWeight:282 RetIndex:1986
CompName:cis-10-Heptadecenoic acid, methyl ester



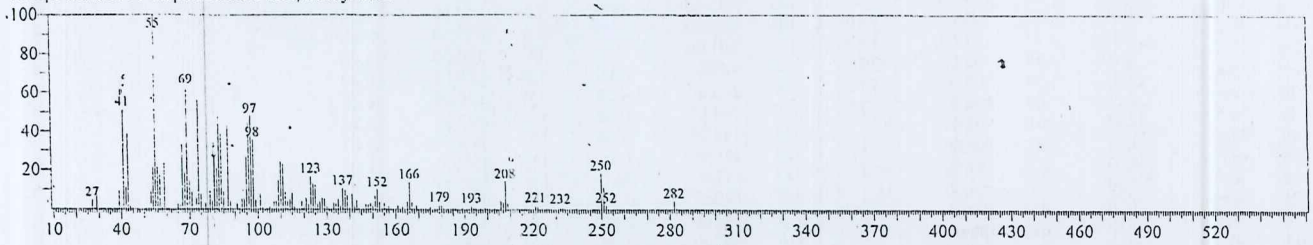
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	15.00	1.00	51	84.00	38.83	101	135.00	5.10	151	187.00	0.10
2	26.00	0.20	52	85.00	8.81	102	136.00	1.80	152	189.00	0.60
3	27.00	4.70	53	87.00	42.94	103	137.00	10.91	153	190.00	0.20
4	28.00	1.40	54	88.00	4.00	104	138.00	9.81	154	191.00	0.20
5	29.00	11.01	55	89.00	0.30	105	139.00	6.91	155	192.00	0.20
6	30.00	0.30	56	90.00	0.10	106	140.00	1.10	156	193.00	1.80
7	31.00	0.50	57	91.00	2.80	107	141.00	7.71	157	194.00	1.20
8	33.00	0.10	58	92.00	0.80	108	142.00	1.60	158	195.00	0.70
9	39.00	9.21	59	93.00	5.10	109	143.00	4.50	159	196.00	0.20
10	40.00	2.20	60	94.00	5.30	110	144.00	0.60	160	197.00	0.30
11	41.00	51.46	61	95.00	26.62	111	145.00	0.20	161	198.00	0.10
12	42.00	11.51	62	96.00	44.14	112	146.00	0.10	162	199.00	1.10
13	43.00	38.63	63	97.00	47.84	113	147.00	2.60	163	200.00	0.60
14	44.00	1.50	64	98.00	35.73	114	148.00	2.70	164	201.00	0.10
15	45.00	2.10	65	99.00	5.00	115	149.00	3.30	165	203.00	0.30
16	46.00	0.10	66	100.00	1.20	116	150.00	1.70	166	204.00	0.10
17	50.00	0.20	67	101.00	8.01	117	151.00	6.81	167	206.00	4.30
18	51.00	0.70	68	102.00	0.90	118	152.00	10.01	168	207.00	3.50
19	52.00	0.70	69	103.00	0.20	119	153.00	4.00	169	208.00	14.31
20	53.00	9.01	70	104.00	0.10	120	154.00	0.80	170	209.00	3.10
21	54.00	21.22	71	105.00	1.60	121	155.00	3.30	171	210.00	0.30
22	55.00	100.00	72	106.00	0.70	122	156.00	0.60	172	211.00	0.10
23	56.00	21.42	73	107.00	4.10	123	157.00	1.40	173	213.00	0.30
24	57.00	17.32	74	108.00	3.90	124	158.00	0.30	174	214.00	0.30
25	58.00	1.10	75	109.00	14.81	125	159.00	0.10	175	217.00	0.10
26	59.00	23.42	76	110.00	24.02	126	161.00	2.00	176	219.00	0.10
27	60.00	0.70	77	111.00	22.62	127	162.00	0.80	177	221.00	2.10
28	61.00	0.30	78	112.00	8.81	128	163.00	1.40	178	222.00	1.40
29	62.00	0.10	79	113.00	3.90	129	164.00	0.70	179	223.00	0.20
30	63.00	0.10	80	114.00	5.00	130	165.00	3.90	180	225.00	0.10
31	64.00	0.10	81	115.00	8.21	131	166.00	13.91	181	227.00	0.20
32	65.00	3.00	82	116.00	1.30	132	167.00	3.60	182	231.00	0.10
33	66.00	2.20	83	117.00	0.30	133	168.00	0.60	183	232.00	1.40
34	67.00	33.63	84	118.00	0.30	134	169.00	2.00	184	233.00	1.10
35	68.00	18.72	85	119.00	4.00	135	170.00	0.30	185	234.00	0.20
36	69.00	62.77	86	120.00	1.50	136	171.00	0.70	186	235.00	0.40
37	70.00	15.21	87	121.00	5.30	137	172.00	0.30	187	236.00	0.10
38	71.00	8.21	88	122.00	2.40	138	173.00	0.10	188	239.00	0.90
39	72.00	1.00	89	123.00	16.82	139	175.00	1.30	189	240.00	0.10
40	73.00	5.61	90	124.00	13.01	140	176.00	0.40	190	241.00	0.10
41	74.00	56.16	91	125.00	12.51	141	177.00	0.60	191	250.00	18.42
42	75.00	7.41	92	126.00	2.70	142	178.00	0.30	192	251.00	11.41
43	76.00	0.50	93	127.00	4.10	143	179.00	2.30	193	252.00	1.90
44	77.00	2.90	94	128.00	5.50	144	180.00	1.90	194	253.00	0.30
45	78.00	1.00	95	129.00	5.20	145	181.00	0.90	195	254.00	0.10
46	79.00	9.31	96	130.00	1.40	146	182.00	0.20	196	264.00	0.30
47	80.00	4.60	97	131.00	0.20	147	183.00	0.50	197	282.00	4.40
48	81.00	30.73	98	132.00	0.20	148	184.00	0.10	198	283.00	1.10
49	82.00	20.72	99	133.00	3.50	149	185.00	1.10	199	284.00	0.10
50	83.00	50.46	100	134.00	3.30	150	186.00	0.60			

Spectrum Comparison

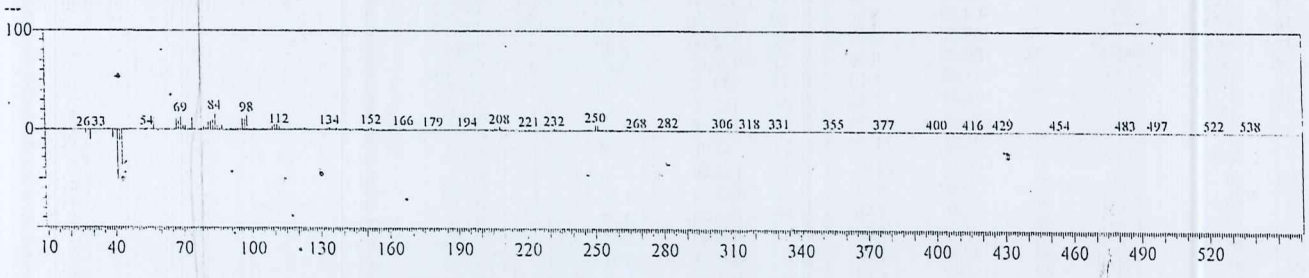
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:16.905(Scan#:2782)
MassPeaks:356
RawMode:Averaged 16.900-16.910(2781-2783) BasePeak:55.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:104416 Formula:C18H34O2 CAS:0-00-0 MolWeight:282
MassPeaks:199 BasePeak:55.00(10000)
CompName:cis-10-Heptadecenoic acid, methyl ester



Spectrum3 #Calculation Result#
MassPeaks:346 BasePeak:84.10(1759)

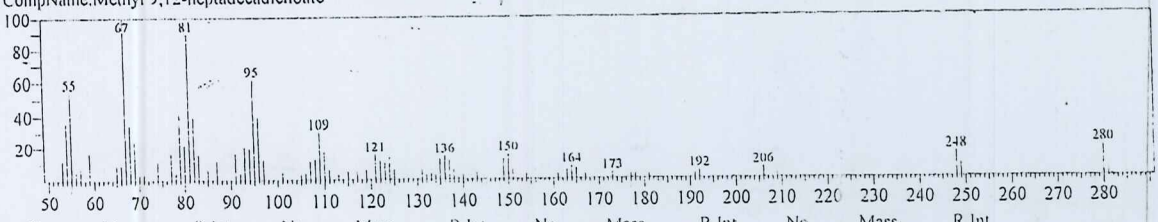


Compound Information

Entry:102817 Library:NIST11.LIB

Formula:C18H32O2 CAS:0-00-0 MolWeight:280 RetIndex:1994

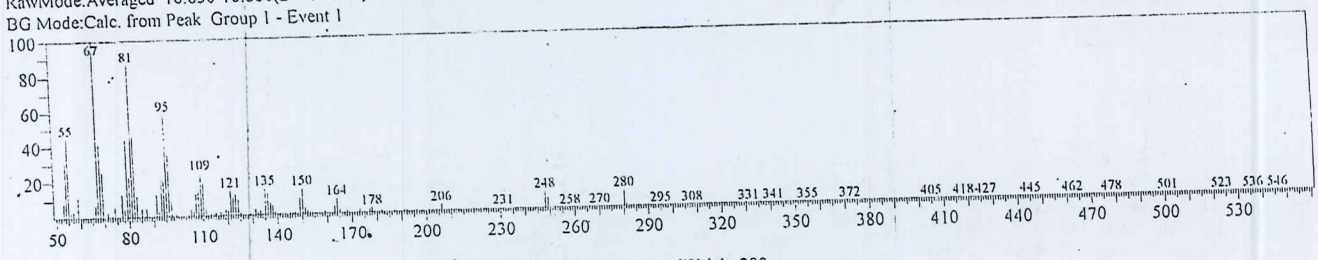
CompName:Methyl 9,12-heptadecadienoate



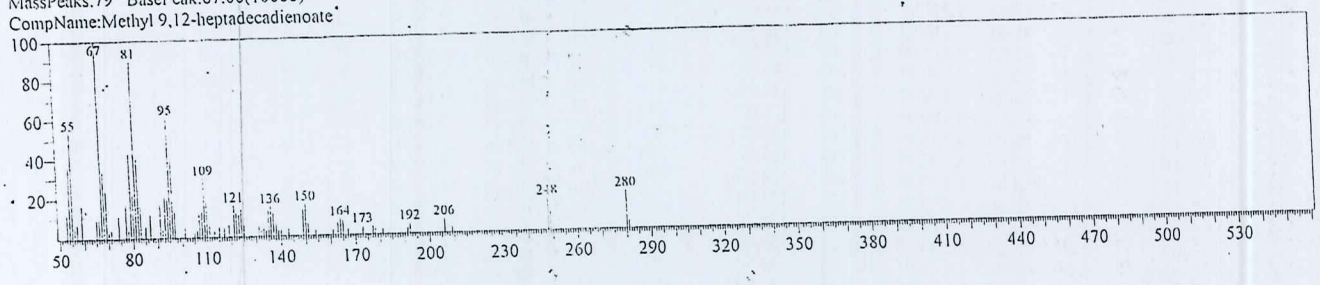
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	53.00	11.91	21	83.00	15.91	41	117.00	5.00	61	151.00	6.01
2	54.00	35.93	22	85.00	6.01	42	119.00	6.01	62	154.00	3.00
3	55.00	53.96	23	87.00	11.91	43	121.00	15.91	63	161.00	3.00
4	56.00	5.00	24	91.00	16.92	44	122.00	11.91	64	163.00	6.01
5	57.00	7.01	25	92.00	4.00	45	123.00	10.91	65	164.00	8.01
6	59.00	16.92	26	93.00	20.92	46	124.00	13.91	66	165.00	7.01
7	65.00	9.01	27	94.00	19.92	47	125.00	6.01	67	167.00	3.00
8	66.00	9.01	28	95.00	60.96	48	131.00	6.01	68	173.00	4.00
9	67.00	100.00	29	96.00	38.94	49	132.00	3.00	69	177.00	4.00
10	68.00	34.93	30	97.00	12.91	50	133.00	4.00	70	178.00	3.00
11	69.00	23.92	31	101.00	5.00	51	134.00	3.00	71	181.00	3.00
12	70.00	3.00	32	105.00	3.00	52	135.00	12.91	72	191.00	3.00
13	71.00	4.00	33	106.00	4.00	53	136.00	14.91	73	192.00	5.00
14	74.00	10.91	34	107.00	11.91	54	137.00	11.91	74	206.00	7.01
15	77.00	16.92	35	108.00	12.91	55	138.00	6.01	75	209.00	3.00
16	78.00	4.00	36	109.00	29.93	56	139.00	3.00	76	248.00	15.91
17	79.00	42.94	37	110.00	17.92	57	140.00	3.00	77	249.00	9.01
18	80.00	21.92	38	111.00	6.01	58	143.00	4.00	78	280.00	18.92
19	81.00	89.99	39	113.00	3.00	59	149.00	12.91	79	281.00	4.00
20	82.00	39.94	40	115.00	5.00	60	150.00	15.91			

Spectrum Comparison

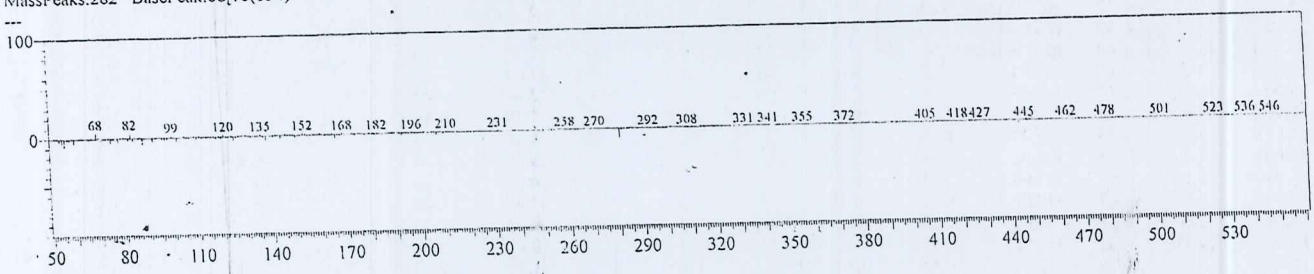
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:16.855(Scan#:2772)
MassPeaks:313
RawMode:Averaged 16.850-16.860(2771-2773) BasePeak:67.10(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:102817 Formula:C18H32O2 CAS:0-00-0 MolWeight:280
MassPeaks:79 BasePeak:67.00(10000)
CompName:Methyl 9,12-heptadecadienoate

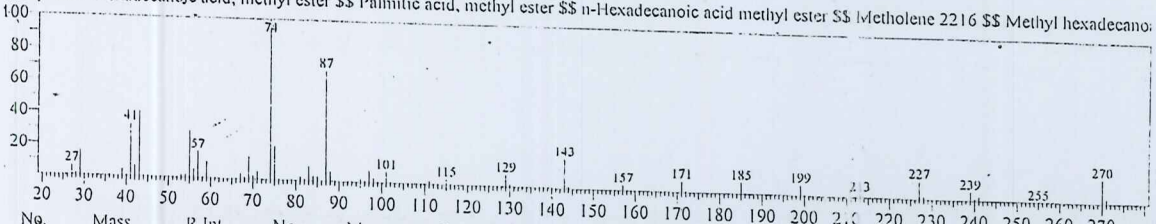


Spectrum3 #Calculation Result#
MassPeaks:282 BasePeak:68.10(654)



Compound Information

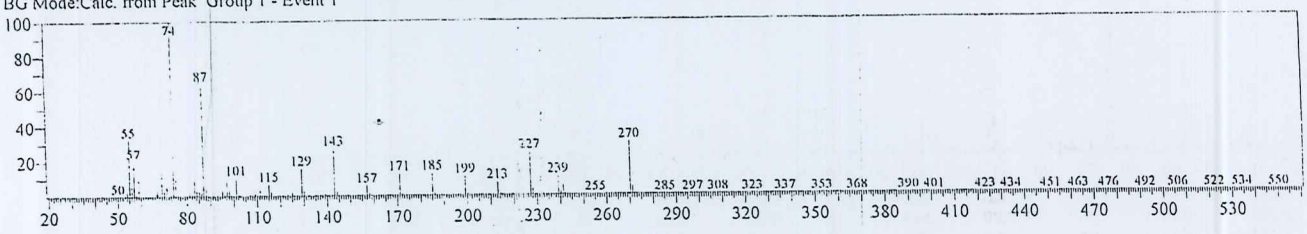
Entry:24298 Library:NIST11S.LIB
Formula:C17H34O2 CAS:112-39-0 MolWeight:270 RetIndex:1878
CompName:Hexadecanoic acid, methyl ester $$ Palmitic acid, methyl ester $$ n-Hexadecanoic acid methyl ester $$ Metholene 2216 $$ Methyl hexadecano



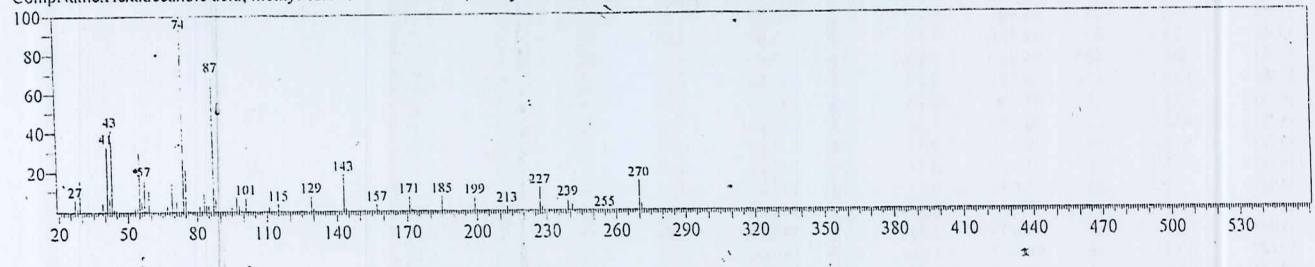
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	26.00	0.24	39	77.00	0.26	77	120.00	0.04	115	179.00	0.06
2	27.00	6.14	40	79.00	1.03	78	121.00	0.63	116	180.00	0.03
3	28.00	1.77	41	80.00	0.28	79	122.00	0.13	117	181.00	0.05
4	29.00	16.12	42	81.00	2.74	80	123.00	0.61	118	185.00	7.29
5	30.00	0.47	43	82.00	1.34	81	124.00	0.25	119	186.00	0.95
6	31.00	0.78	44	83.00	9.21	82	125.00	1.09	120	187.00	0.11
7	33.00	0.22	45	84.00	3.51	83	126.00	0.28	121	191.00	0.08
8	38.00	0.04	46	85.00	2.96	84	127.00	0.16	122	194.00	0.16
9	39.00	4.59	47	86.00	0.29	85	129.00	7.64	123	195.00	0.13
10	40.00	0.82	48	87.00	69.73	86	130.00	1.83	124	196.00	0.35
11	41.00	33.34	49	88.00	6.46	87	131.00	0.16	125	197.00	0.11
12	42.00	7.16	50	89.00	0.45	88	135.00	0.44	126	199.00	6.67
13	43.00	41.53	51	91.00	0.11	89	136.00	0.10	127	200.00	0.95
14	44.00	1.56	52	93.00	0.87	90	137.00	0.28	128	201.00	0.08
15	45.00	1.42	53	94.00	0.26	91	138.00	0.20	129	208.00	0.03
16	51.00	0.11	54	95.00	2.24	92	139.00	0.54	130	209.00	0.08
17	52.00	0.15	55	96.00	1.16	93	140.00	0.15	131	210.00	0.06
18	53.00	1.88	56	97.00	7.52	94	141.00	0.13	132	213.00	2.49
19	54.00	2.15	57	98.00	3.29	95	143.00	18.87	133	214.00	0.46
20	55.00	30.07	58	99.00	0.84	96	144.00	2.02	134	215.00	0.04
21	56.00	5.82	59	100.00	0.26	97	145.00	0.14	135	219.00	0.11
22	57.00	16.77	60	101.00	7.03	98	149.00	0.34	136	220.00	0.08
23	58.00	1.29	61	102.00	0.87	99	150.00	0.06	137	221.00	0.06
24	59.00	10.61	62	103.00	0.09	100	151.00	0.09	138	223.00	0.08
25	60.00	0.42	63	105.00	0.04	101	152.00	0.14	139	227.00	11.48
26	61.00	0.18	64	107.00	0.59	102	153.00	0.32	140	228.00	1.75
27	65.00	0.26	65	108.00	0.14	103	154.00	0.06	141	229.00	0.26
28	66.00	0.16	66	109.00	1.07	104	157.00	3.42	142	236.00	0.08
29	67.00	3.62	67	110.00	0.55	105	158.00	0.68	143	237.00	0.21
30	68.00	1.66	68	111.00	2.39	106	159.00	0.05	144	239.00	5.36
31	69.00	14.43	69	112.00	0.72	107	163.00	0.16	145	240.00	1.11
32	70.00	2.80	70	113.00	0.43	108	167.00	0.08	146	241.00	2.87
33	71.00	5.52	71	114.00	0.09	109	168.00	0.06	147	254.00	0.56
34	72.00	0.43	72	115.00	3.66	110	169.00	0.02	148	255.00	0.08
35	73.00	0.35	73	116.00	1.09	111	171.00	7.08	149	256.00	0.03
36	74.00	100.00	74	117.00	0.06	112	172.00	1.14	150	270.00	15.01
37	75.00	21.48	75	118.00	0.06	113	173.00	0.09	151	271.00	2.91
38	76.00	1.06	76	119.00	0.04	114	177.00	0.08	152	272.00	0.29

Spectrum Comparison

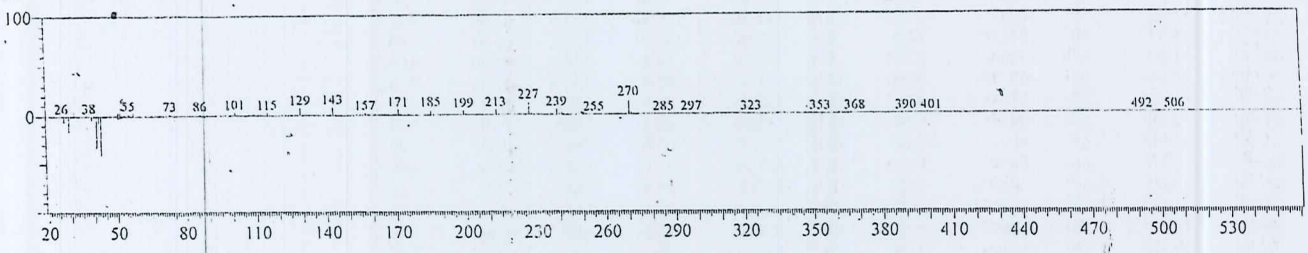
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:16.190(Scan#:2639)
MassPeaks:312
RawMode:Averaged 16.185-16.195(2638-2640) BasePeak:74.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11s.lib Entry:24298 Formula:C17H34O2 CAS:112-39-0 MolWeight:270
MassPeaks:152 BasePeak:74.00(10000)
CompName:Hexadecanoic acid, methyl ester $$ Palmitic acid, methyl ester $$ n-Hexadecanoic acid methyl ester $$ Metholene 2216 $$ Methyl hexadecanoate $$ Methyl n-hexa

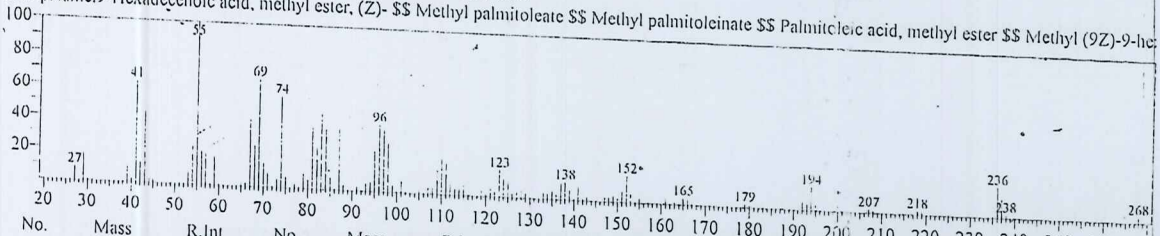


Spectrum3 #Calculation Result#
MassPeaks:205 BasePeak:270.25(1518)



Compound Information

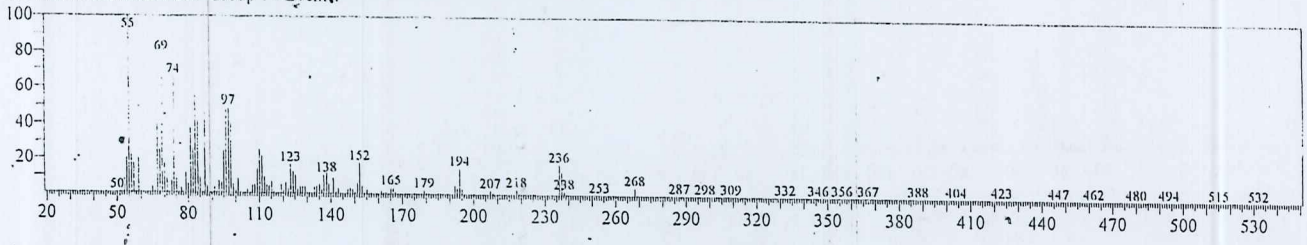
Entry:24123 Library:NIST11S.LIB
Formula:C17H32O2 CAS:1120-25-8 MolWeight:268 RetIndex:1886
CompName:9-Hexadecenoic acid, methyl ester, (Z)- $$ Methyl palmitoleate $$ Methyl palmitoleinate $$ Palmitoleic acid, methyl ester $$ Methyl (9Z)-9-he



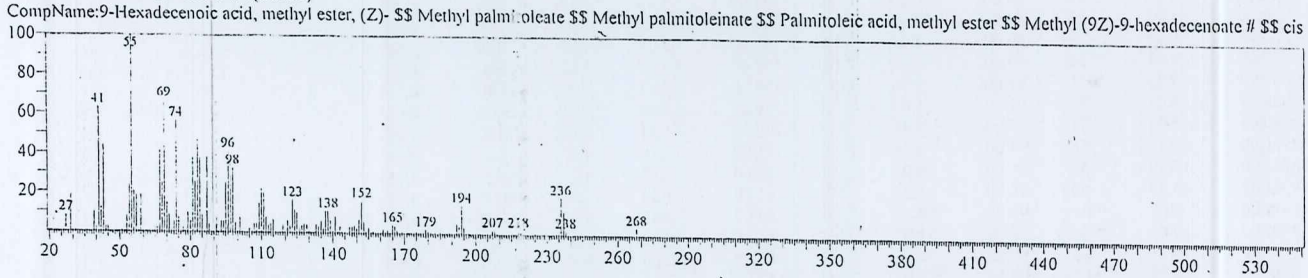
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	26.00	0.58	48	83.00	46.73	95	131.00	0.44	142	180.00	1.35
2	27.00	8.25	49	84.00	37.40	96	132.00	0.21	143	181.00	1.03
3	29.00	18.35	50	85.00	8.12	97	133.00	3.88	144	182.00	0.33
4	30.00	0.75	51	86.00	0.69	98	134.00	3.49	145	183.00	0.41
5	31.00	1.02	52	87.00	37.94	99	135.00	5.68	146	184.00	0.04
6	33.00	0.24	53	88.00	3.71	100	136.00	3.00	147	185.00	1.05
7	37.00	0.02	54	89.00	0.37	101	137.00	10.68	148	186.00	0.59
8	38.00	0.20	55	91.00	3.26	102	138.00	11.04	149	187.00	0.14
9	39.00	9.94	56	92.00	1.05	103	139.00	6.00	150	189.00	0.63
10	40.00	2.28	57	93.00	5.47	104	140.00	1.34	151	190.00	0.24
11	41.00	63.18	58	94.00	5.74	105	141.00	8.58	152	191.00	0.24
12	42.00	12.39	59	95.00	24.98	106	142.00	1.53	153	192.00	5.15
13	43.00	43.79	60	96.00	41.22	107	143.00	3.26	154	193.00	3.72
14	44.00	2.62	61	97.00	38.73	108	144.00	0.45	155	194.00	14.51
15	45.00	2.53	62	98.00	32.87	109	145.00	0.20	156	195.00	3.33
16	50.00	0.21	63	99.00	4.60	110	146.00	0.08	157	196.00	0.42
17	51.00	0.74	64	100.00	1.03	111	147.00	2.96	158	197.00	0.24
18	52.00	0.64	65	101.00	7.37	112	148.00	3.02	159	199.00	0.30
19	53.00	7.98	66	102.00	0.72	113	149.00	3.52	160	200.00	0.34
20	54.00	23.58	67	103.00	0.16	114	150.00	2.40	161	203.00	0.02
21	55.00	100.00	68	104.00	0.07	115	151.00	6.70	162	205.00	0.11
22	56.00	20.85	69	105.00	2.17	116	152.00	16.41	163	206.00	0.05
23	57.00	19.05	70	106.00	0.84	117	153.00	5.31	164	207.00	2.18
24	58.00	1.21	71	107.00	4.28	118	154.00	1.00	165	208.00	1.58
25	59.00	18.74	72	108.00	4.27	119	155.00	2.54	166	209.00	0.29
26	60.00	0.76	73	109.00	15.00	120	156.00	0.41	167	210.00	0.03
27	61.00	0.24	74	110.00	22.15	121	157.00	1.05	168	211.00	0.05
28	62.00	0.02	75	111.00	19.70	122	158.00	0.41	169	213.00	0.13
29	63.00	0.10	76	112.00	7.84	123	159.00	0.24	170	217.00	0.25
30	65.00	2.59	77	113.00	4.02	124	161.00	1.92	171	218.00	2.33
31	66.00	2.24	78	114.00	4.14	125	162.00	0.82	172	219.00	1.37
32	67.00	41.40	79	115.00	6.56	126	163.00	1.55	173	220.00	0.18
33	68.00	25.12	80	116.00	1.02	127	164.00	1.23	174	221.00	0.46
34	69.00	66.82	81	117.00	0.28	128	165.00	4.25	175	222.00	0.04
35	70.00	14.83	82	118.00	0.28	129	166.00	3.65	176	223.00	0.02
36	71.00	8.70	83	119.00	4.13	130	167.00	1.69	177	225.00	0.86
37	72.00	1.27	84	120.00	1.57	131	168.00	0.48	178	226.00	0.16
38	73.00	5.63	85	121.00	5.91	132	169.00	0.93	179	234.00	1.00
39	74.00	56.68	86	122.00	3.30	133	170.00	0.09	180	235.00	1.02
40	75.00	7.25	87	123.00	16.59	134	171.00	1.13	181	236.00	18.80
41	76.00	0.52	88	124.00	11.60	135	172.00	0.68	182	237.00	12.09
42	77.00	2.68	89	125.00	10.10	136	173.00	0.28	183	238.00	2.04
43	78.00	1.37	90	126.00	2.33	137	175.00	1.13	184	239.00	0.37
44	79.00	9.79	91	127.00	3.66	138	176.00	0.34	185	250.00	0.41
45	80.00	5.60	92	128.00	4.34	139	177.00	0.69	186	251.00	0.02
46	81.00	38.05	93	129.00	4.04	140	178.00	0.53	187	268.00	3.86
47	82.00	25.33	94	130.00	1.04	141	179.00	2.29	188	269.00	0.78

Spectrum Comparison

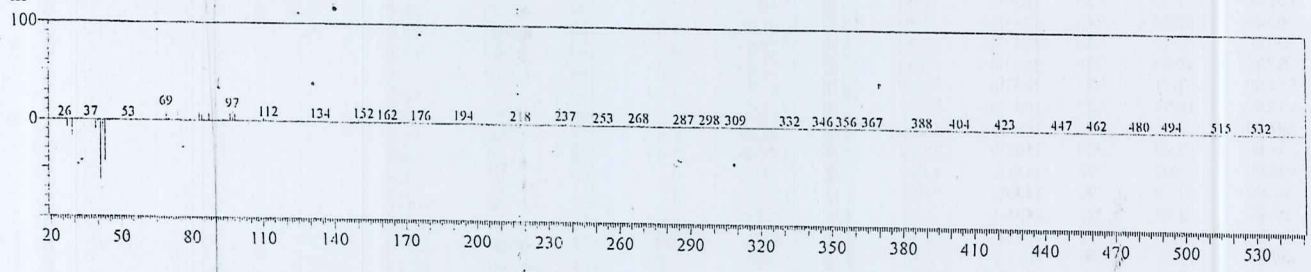
Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:15.955(Scan#:2592)
MassPeaks:342
RawMode:Averaged 15.950-15.960(2591-2593) BasePeak:55.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11s.lib Entry:24123 Formula:C17H32O2 CAS:1120-25-8 MolWeight:268
MassPeaks:188 BasePeak:55.00(10000)
CompName:9-Hexadecenoic acid, methyl ester, (Z)- $$ Methyl palmitoleate $$ Methyl palmitoleinate $$ Palmitoleic acid, methyl ester $$ Methyl (9Z)-9-hexadecenoate # $$ cis

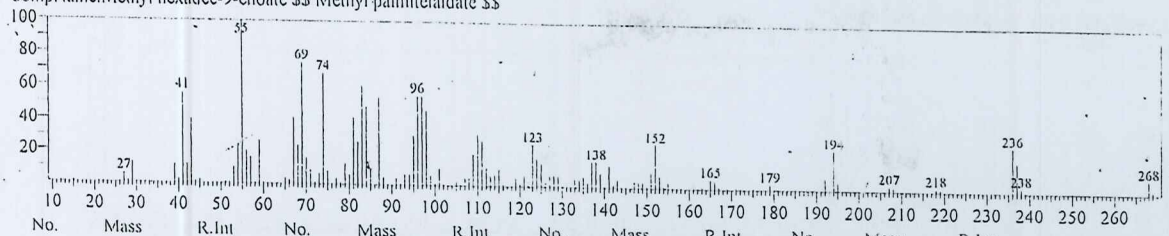


Spectrum3 #Calculation Result#
MassPeaks:333 BasePeak:69.10(1183)



Compound Information

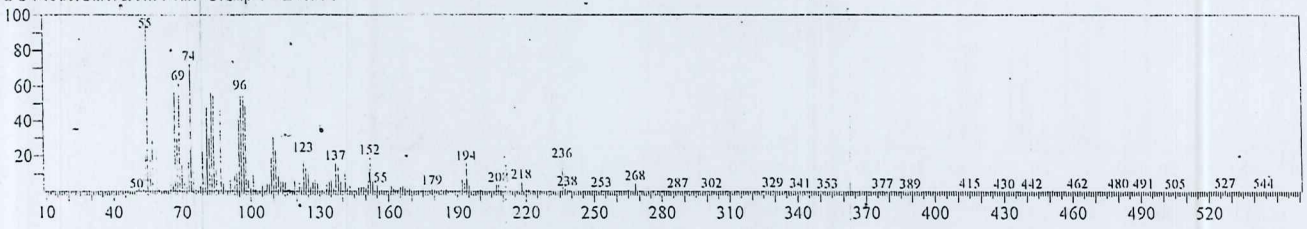
Entry:93480 Library:NIST11.LIB
Formula:C17H32O2 CAS:10030-74-7 MolWeight:268 RetIndex:1886
CompName:Methyl hexadec-9-enoate $$ Methyl palmitelaidate $$



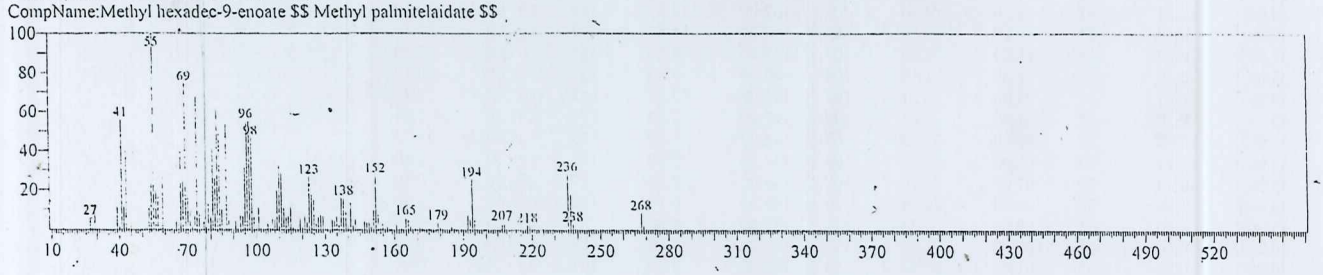
No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int	No.	Mass	R.Int
1	15.00	1.20	49	83.00	61.27	97	133.00	5.00	145	183.00	0.60
2	26.00	0.20	50	84.00	48.74	98	134.00	4.60	146	184.00	0.10
3	27.00	5.71	51	85.00	10.11	99	135.00	6.71	147	185.00	1.70
4	28.00	1.70	52	87.00	54.46	100	136.00	3.00	148	186.00	1.00
5	29.00	12.51	53	88.00	4.90	101	137.00	15.71	149	187.00	0.20
6	30.00	0.40	54	89.00	0.50	102	138.00	15.81	150	189.00	0.80
7	31.00	0.60	55	91.00	4.50	103	139.00	8.71	151	196.00	0.30
8	33.00	0.20	56	92.00	1.10	104	140.00	1.60	152	191.00	0.10
9	39.00	11.21	57	93.00	6.91	105	141.00	13.41	153	192.00	7.41
10	40.00	2.50	58	94.00	6.81	106	142.00	2.40	154	193.00	5.61
11	41.00	55.96	59	95.00	31.23	107	143.00	5.20	155	194.00	25.12
12	42.00	11.71	60	96.00	55.26	108	144.00	0.70	156	195.00	5.10
13	43.00	40.14	61	97.00	55.26	109	145.00	0.30	157	196.00	0.50
14	44.00	1.60	62	98.00	46.64	110	146.00	0.10	158	197.00	0.30
15	45.00	2.40	63	99.00	6.31	111	147.00	4.50	159	198.00	0.10
16	46.00	0.10	64	100.00	1.60	112	148.00	3.60	160	199.00	0.50
17	50.00	0.20	65	101.00	10.91	113	149.00	3.70	161	200.00	0.60
18	51.00	0.90	66	102.00	1.20	114	150.00	1.50	162	201.00	0.10
19	52.00	0.90	67	103.00	0.30	115	151.00	9.71	163	203.00	0.10
20	53.00	10.51	68	104.00	0.10	116	152.00	27.22	164	205.00	0.10
21	54.00	24.12	69	105.00	2.90	117	153.00	7.61	165	207.00	3.20
22	55.00	100.00	70	106.00	1.10	118	154.00	1.10	166	208.00	2.40
23	56.00	20.62	71	107.00	5.30	119	155.00	3.80	167	209.00	0.40
24	57.00	16.61	72	108.00	5.00	120	156.00	0.70	168	211.00	0.20
25	58.00	1.10	73	109.00	19.62	121	157.00	1.40	169	213.00	0.30
26	59.00	26.92	74	110.00	32.23	122	158.00	0.50	170	214.00	0.10
27	60.00	0.80	75	111.00	28.63	123	159.00	0.10	171	217.00	0.30
28	61.00	0.30	76	112.00	11.01	124	161.00	2.40	172	218.00	2.30
29	62.00	0.10	77	113.00	6.11	125	162.00	0.90	173	219.00	1.90
30	63.00	0.20	78	114.00	6.91	126	163.00	1.40	174	220.00	0.30
31	65.00	4.10	79	115.00	10.71	127	164.00	0.60	175	221.00	0.70
32	66.00	2.80	80	116.00	1.70	128	165.00	5.81	176	222.00	0.10
33	67.00	41.64	81	117.00	0.40	129	166.00	5.00	177	225.00	1.30
34	68.00	24.02	82	118.00	0.40	130	167.00	1.80	178	226.00	0.20
35	69.00	74.58	83	119.00	5.81	131	168.00	0.40	179	227.00	0.10
36	70.00	16.31	84	120.00	2.10	132	169.00	1.10	180	236.00	28.03
37	71.00	8.81	85	121.00	7.31	133	170.00	0.20	181	237.00	18.32
38	72.00	1.40	86	122.00	3.60	134	171.00	1.70	182	238.00	2.80
39	73.00	6.71	87	123.00	26.42	135	172.00	1.00	183	239.00	0.60
40	74.00	67.97	88	124.00	17.32	136	173.00	0.20	184	240.00	0.10
41	75.00	8.51	89	125.00	14.91	137	175.00	1.50	185	250.00	0.50
42	76.00	0.60	90	126.00	3.20	138	176.00	0.50	186	251.00	0.10
43	77.00	4.00	91	127.00	6.41	139	177.00	0.50	187	266.00	0.10
44	78.00	1.50	92	128.00	7.51	140	178.00	0.40	188	268.00	8.31
45	79.00	12.91	93	129.00	6.81	141	179.00	3.40	189	269.00	1.90
46	80.00	6.21	94	130.00	1.60	142	180.00	1.70	190	270.00	0.20
47	81.00	41.94	95	131.00	0.30	143	181.00	1.00			
48	82.00	26.42	96	132.00	0.20	144	182.00	0.40			

Spectrum Comparison

Spectrum1 #Data# Fixed oil (Marwa).QGD R.Time:15.915(Scan#:2584)
MassPeaks:319
RawMode:Averaged 15.910-15.920(2583-2585) BasePeak:55.05(10000)
BG Mode:Calc. from Peak Group 1 - Event 1



Spectrum2 #Library# NIST11.lib Entry:93480 Formula:C17H32O2 CAS:10030-74-7 MolWeight:268
MassPeaks:190 BasePeak:55.00(10000)
CompName:Methyl hexadec-9-enoate $$ Methyl palmitelaidate $$



Spectrum3 #Calculation Result#
MassPeaks:354 BasePeak:67.05(1488)