

Tricaprylin (Trioctanoin): A Comprehensive Review of Its Physicochemical Properties, Metabolism, and Pharmaceutical Applications

Dineshkumar Palanivel¹, Mouleeswaran Rajendran^{2*}, Sakthi Sundaram Subramaniam², Yamuna Rameshbabu², Sharmila Ramachandran², Sobiya Murugan²

¹Department of Pharmacy Practice, Vivekanandha Pharmacy College for Women, Sankagiri, Salem.

²Department of Pharmacology, Vivekanandha Pharmacy College for Women, Sankagiri, Salem.

Date of Submission: 05-03-2026

Date of Acceptance: 15-03-2026

ABSTRACT

Caprylic acid, a medium chain (C8) mono carboxylic acid saturated fatty acid (MCFA) primarily found in goat milk and coconut oil, is also utilized as an antimicrobial in the food industry. Beta hydroxybutyric acid and acetoacetic acid are ketone molecules produced during the metabolism of caprylic acid. These molecules can subsequently be converted into acetyl coA via the citric acid cycle to produce energy. Due to structural saturation, medium chain triglycerides (MCT) with six to twelve carbon atoms, like tricapyrylin, are resistant to oxidation.

Tricaprylin, also called Trioctanoin, is a medium-chain triglyceride (MCT) which is a compound containing three molecules of caprylic acid (octanoic acid) and glycerol, each molecule of which is esterified. It has been well known that it has big usage in pharmaceutical, nutritional and cosmetic sectors based on its high metabolic and physicochemical characteristics. Tricaprylin is rapidly hydrolysed and absorbed in the gastrointestinal tract, unlike long-chain triglycerides, which is a rapid source of energy and increased bioavailability of lipophilic drugs. It is also widely utilized in pharmaceutical preparations, both as a lipid excipient in a drug delivery system, such as an emulsion, as a lipid-based carrier, or as a parenteral nutrition preparation. Also, tricapyrylin has received interest in its possible therapeutic applications in metabolism and neurological diseases, as well as in illnesses that need fast energy supplementation. It is also useful in cosmetic formulations due to its stability, low level of toxicity and biocompatibility as an emollient and skin-conditioning agent. The present overview shows the chemical structure, sources, physicochemical properties, metabolism, pharmaceutical uses, and therapeutic potential of

tricapyrylin (Trioctanoin) with the focus on its significance as a multifunctional compound in the contemporary biomedical and industrial practice.

KEYWORDS: Tricaprylin, Trioctanoin, Medium-chain triglycerides, Lipid-based drug delivery, Caprylic acid, Drug formulation.

I. INTRODUCTION

[1] Trioctanoin is an alternate designation for tricapyrylin. It is produced through the acylation of the three hydroxyl groups in glycerol with octanoic acid. Trioctanoin functions as an anticonvulsant and a plant metabolite. Classified as a triglyceride and an octanoic ester, tricapyrylin is a triester. [3,6] This triglyceride comprises three molecules of caprylic acid (octanoic acid) attached to a glycerol backbone. It results from the reaction between glycerin and caprylic acid to form a triester. [10] Frequently, it is utilized as a medium chain triglyceride (MCT) in various formulations. Its primary function is as an emollient in a wide array of personal care products, including creams, deodorants, hair conditioners, lotions, makeup, and sunscreens. It also forms a protective barrier on the skin to prevent moisture loss. Moreover, it helps dissolve active ingredients, enhancing the efficacy of the product. Additionally, it is used to deliver fat-soluble components like vitamins to the skin. In its unprocessed state, it presents as a clear, colourless to pale yellow liquid with an oily consistency. [9] Tricaprylin is obtained from coconut or palm oil through saponification and fractional distillation, and it has the capability to be digested rapidly and absorbed by the body. This compound is also non-volatile and compatible with various ingredients, improving the stability and effectiveness of cosmetic formulations. Axona, derived from tricapyrylin, is utilized as a medical

food designed for the dietary management of metabolic processes associated with mild to moderate Alzheimer's disease. Administered as a caprylin triglyceride oral formulation, it aims to induce a mild state of chronic ketosis to enhance mitochondrial metabolism. [8] Axona offers a straightforward and safe method to trigger hyperketonemia, thus supplying an alternative energy source for patients with Alzheimer's disease. Upon oral intake of Axona, enzymes in the gut digest the tricapylin, yielding medium-chain fatty acids (MCFAs) that then enter the bloodstream and travel to the liver. These MCFs rapidly reach the liver, where they undergo oxidation to generate ketones. Since the liver does not utilize ketones, they circulate in the bloodstream to provide energy for non-liver tissues. Certain ketones can cross the blood-brain barrier and are subsequently absorbed by brain cells, where glucose is the primary energy source, and ketones act as a backup.

[7] After Axona is ingested, the body produces ketones that serve as an alternative energy supply for brain cells impacted by glucose insensitivity related to Alzheimer's disease. Goat milk and coconut oil are significant sources of caprylic acid, a medium-chain (C8) saturated fatty acid (MCFA) used in the food industry for its antibacterial properties. Additionally, valproic acid, a well-known antiepileptic medication, has a straight-chain isomer in caprylic acid. When caprylic acid is metabolized, it forms ketone bodies, including acetoacetic acid and beta hydroxybutyric acid, which can be converted to acetyl CoA for energy production through the citric acid cycle.[14] The ketones acetoacetate and β -hydroxybutyrate (β -HB) serve as the primary alternative energy source for the brain when carbohydrate intake is significantly decreased, during fasting, or during intense aerobic exercise. Ketones can replace glucose and can provide up to 80% of the brain's energy demands during medically supervised starvation lasting 40-60 days.

[18] The ketogenic diet, which is very high in fat, has been utilized for several years to manage difficult-to-treat epilepsy in children by significantly increasing plasma ketone levels through strict carbohydrate limitation and low insulin levels. A different method for boosting ketone levels without drastically altering dietary habits or reducing carbohydrate intake involves using medium chain triglycerides (MCTs), which consist of fatty acids with 8 to 12 carbon atoms. [3,4] MCTs lead to a mild to moderate increase in ketone levels when incorporated into a standard meal because they are rapidly absorbed via the

portal vein and quickly converted to acetyl-CoA in the liver through β -oxidation. In contrast, long-chain dietary fatty acids are absorbed as chylomicrons through the lymphatic system and distributed throughout the bloodstream before undergoing digestion. Unlike long-chain fatty acids, medium chain fatty acids can directly enter the inner mitochondrial membrane for β -oxidation without requiring carnitine activation.[1] Due to their saturated structure, medium chain triglycerides (MCTs), such as tricapylin, which includes six to twelve carbon atoms, are resistant to oxidation. MCTs are a type of oil that possesses unique characteristics and offers a variety of health benefits. Unlike long-chain triglycerides, MCTs do not accumulate in the body, and they follow a distinct, advantageous metabolic pathway. The absorption of medium chain fatty acids in the portal vein is greatly enhanced.[10] FERRIS et al. stated that human milk fat, which is rich in MCTs, provides essential structural components for the growth of newborn cells and serves as a vital energy source. Due to the numerous benefits of MCTs in comparison to long-chain triglycerides, there has been considerable interest in developing more efficient production methods for MCTs. MCTs are absorbed and metabolized more quickly than long-chain triglycerides (LCTs), and thus, they may offer obesity-preventing potential in foods.[3] Research has shown that incorporating the MCT tricapylin into the diet may influence intestinal health and fat accumulation.

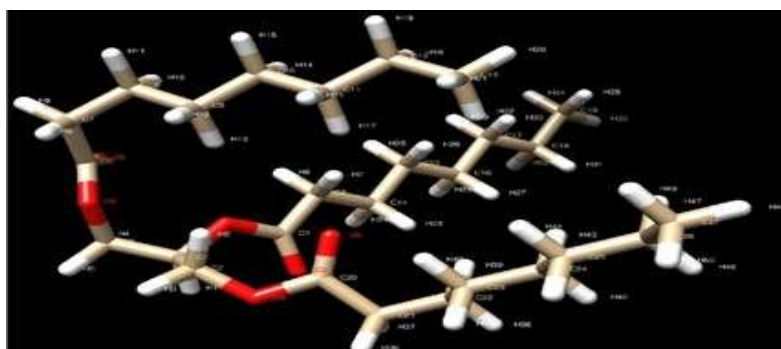
SYNONYMS

Octanoin
Tri-Caprylic acid triglyceride
Caprylin
Glycerol trioctanoate
Glyceryl trioctanoate
Octanoic acid triglyceride
Tricaprylic Glyceride
Trioctanoin
Octanoic acid 1,2,3-propanetriyl ester
Maceight
Glycerin tricaprylate
Tricaprylyl glycerin
Tricapryloylglycerol
Panacete 800
Glyceryl tricaprylate
Caprylic triglyceride
Captex 8000
Emalex KTG
Miglyol 808
Octanoic acid,1,1',1''-(1,2,3-propanetriyl) ester
Sefsol 810

Tricaprilin 2,3-Bis(octanoyloxy)propyl octanoate
 Rofetan
 GTC tricaprilin; MCT
 n-octanoic acid glycerol triester

octanoic acid tricapryloglycerol
 Tricaprylylglycerin
 Trioctonolglycerol

STRUCTURE



PHYSICOCHEMICAL PROPERTIES

[12]

PROPERTIES	VALUE
CHEMICAL NAME	1,3-Di(octanoyloxy)propan-2-yl octanoate
MELTING POINT	9 to 10°C
BOILING POINT	233°C at 133.3 Pa
MOLECULAR FORMULA	C ₂₇ H ₅₀ O
MOLECULAR WEIGHT	470.7 g/mol
ODOUR	Odourless
COLOUR	Clear, colourless to amber brown
REFRACTIVE INDEX	1.447 at 20°C
DENSITY	0.94 -0.96 g/cm ³
HLB VALUE	7.0
SOLUBILITY	soluble in ethanol (95%)
MOISTURE CONTENT	< 0.1% w/w
FLASH POINT	246 °C
ASH VALUE	0.1%
CLOUD POINT	-5.0°C
HEAVY METALS	10 mg/kg
SPECIFIC GRAVITY	0.94
VISCOSITY	23-29mPa(23-29cP)
PEROXIDE VALUE	<0.1
PARTITION COEFFICIENT	Log Pow (octanol: water) =9.20 ⁽³⁾
IODINE NUMBER	<0.3

METHODS OF SYNTHESIS

CHEMICAL SYNTHESIS:

[20] In a 250-mL round-bottom flask equipped with three necks, 6.3 g of glycerol (0.068 mol) and 38.19 g of caprylic acid (0.265 mol) were combined and maintained under a vacuum of 10 mmHg while continuously stirring for 28 hours. [13] The reaction proceeded in two stages, following the methodology outlined by Grewal et al. (1993). During the first stage, a temperature of $160 \pm 5^\circ\text{C}$ was upheld for approximately 8 hours. The temperature was then increased to $200 \pm 5^\circ\text{C}$ for an additional 20 hours. The reaction was halted by slowly cooling the mixture to room temperature prior to releasing the vacuum. The progression of the reaction and the processing of the crude esterification product were carried out as described for the chemical synthesis of tricaproin.

ANALYTICAL SYNTHESIS

[8,10] The optimized conditions for the chemical synthesis of various triacylglycerols were modified for the production of tricaprylin. Due to the lower volatility of caprylic acid, a 30% molar excess of the acid was utilized. After conducting several trials, the optimal condition for the first stage was determined to be a thermal treatment at $160 \pm 5^\circ\text{C}$ for 8 hours under a vacuum of 10 mmHg, which resulted in a clean product mainly composed of unreacted fatty acid and partial acylglycerol species. [5] For the second stage, the best conditions were found to be $200 \pm 5^\circ\text{C}$ for 20 hours under a 10mmHg vacuum, yielding unreacted fatty acid along with di- and tricaprylin. The alkali refining process of the crude product produced a refined fraction that accounted for approximately 81% of the acylation. The purified alkali-refined product, which underwent column chromatography on silica gel, consisted of 3% dicaprylin and 97% tricaprylin. [24] The triacylglycerols (TAGs) were characterized using IR spectra, showing a strong signal at 1730 cm^{-1} from the carbonyl group and prominent bands at 2960, 2930, and 2870 cm^{-1} from carbon-hydrogen bonds. The NMR ^1H spectra of tricaprylin can be employed to characterize TAG compounds (see Table 1). The signal at δ 5.27 triplet with coupling constants of 4.2 and 5.7 Hz corresponds to the C-2 hydrogen of the glycerol moiety. [5,11] The hydrogens H1 and H3 produce a doublet of doublets at δ 4.32 ($J = 12.0$ and 4.2 Hz) and δ 4.17 ($J = 12.0$ and 5.7 Hz), each signal representing two hydrogens. Additional signals are observed at δ 2.32 as a triplet of doublets ($J = 7.2$ and 1.8 Hz) attributed to three methylene groups adjacent to the

carbonyl group. At a more shielded position, a signal at δ 1.61 appears as a triplet of doublets ($J = 7.0$ and 1.2 Hz) corresponding to the methylene group β to the carbonyl group.

[23] The other methylene groups appeared as a broad band at δ 1.28. At the more protected area of the spectrum, at δ 0.88, we noted a triplet signal with $J = 6.6$ Hz corresponding to the terminal methyl group. There was no observed variation in the chemical shifts among tricaprylin, trienantin, and tricaproin. The mass spectrum (Table 2) is characterized by the absence of a molecular peak, while the primary peak typically represents the acyl group RCO^+ . [18] Higher mass peaks usually correspond to M^+-RCO or M^+-RCO_2 (Butkiewicz et al., 1964). The NMR ^{13}C spectroscopy (Table 3) revealed signals at δ 173.34 and δ 172.92; the lower field signal pertains to the two carbons of the carbonyl group connected to carbons C1 and C3, while the signal at δ 172.92 corresponds to the carbonyl group attached to C2 of glycerol. The glycerol portion exhibited two signals, one at δ 62.11 for C3 and C1 and another at δ 68.88 for C2. [22,25] Signals for the acyl portion are well-defined, and the signals for methylene and methyl groups are distinguishable from one another. The methyl group signal is approximately at δ 14, and the methylene groups have slight variations in chemical shift ranging from δ 22 to δ 34. Methylene groups closest to the carbonyl group exhibit a low field position. For the diacylglycerol dienantin, the IR spectrum features a strong absorption band at 3463 cm^{-1} from the hydroxyl group and a prominent band at 1741 cm^{-1} from the carbonyl group. The C-H bond signals are observed at 2956, 2930, and 2859 cm^{-1} . The NMR ^1H spectrum (Table 1) is distinguished by the signal at δ 4.057–4.220, integrating for five hydrogens from the glycerol component. The methylene group adjacent to the carbonyl group produces a triplet signal at δ 2.353 with $J = 7.5$ Hz. The NMR ^{13}C spectrum (Table 3) displayed a signal at δ 173.96 for the carbonyl groups, with other signals similar to those obtained for trienantin. [24] The mass spectrum (Table 2) indicated a base peak at m/z 113u, corresponding to $\text{C}_{17}\text{H}_{13}\text{O}$. Similar to trienantin, the molecular ion peak was absent, and the proposed structure for diacylenantoin was 1,3-dienantoin. In this study, high yields of triacylglycerols were achieved in a solvent-free medium and without chemical catalysts, minimizing byproduct formation and product darkening. Under comparable conditions, Grewal et al. (1993) reported an 85–90% yield of trierucin, a homogeneous triacylglycerol derived

from erucic acid (13-docosaenoic acid). [7] The temperature of 250°C used in the second stage of their reaction was challenging to replicate in the current study due to the volatility of the fatty acids involved. Despite attempts to synthesize triacylglycerols through chemical processes with greater efficiency using chemical catalysts (Foglia

et al., 2004; Fauconnot et al., 2006), the methods used here ensure the suitability of the products for human consumption, making them relevant for the food industry. Additionally, the limited documentation in the literature regarding the chemical synthesis of MCTs and SCTs highlights the innovative nature of this work.

Table-1 ¹H-NMR data for tricaprylin

H	TRICAPRYLIN
Glycerol moiety C2 C1 and C3 HA HB	5.27ttJ=5.7 and 4.2(1H) 4.32ddJ=12.0 and 4.2(2H) 4.17ddJ=12.0 and 5.7(2H)
Acyl moiety C ₂ ' , C ₂ '', C ₂ '''' C ₃ ' , C ₃ '', C ₃ '''' C ₄ ' , C ₄ '', C ₄ '''' C ₅ ' , C ₅ '', C ₅ '''' C ₆ ' , C ₆ '', C ₆ '''' C ₇ ' , C ₇ '', C ₇ '''' C ₈ ' , C ₈ '', C ₈ ''''	2.32tdJ=7.2 and 1.8(6H) 1.61tdJ=7.2 and 1.2(6H) 1.20-1.36bb 1.20-1.36bb 1.20-1.36bb 1.20-1.36bb 0.88tJ=6.6(9H)

Table-2 Mass spectra of tricaprylin

Tricaprylin m/z (relative intensity %) fragmentation ion
470 (0) C ₂₇ H ₅₀ O ₅
327 (20) C ₁₉ H ₃₅ O ₄
184 (5) C ₁₁ H ₂₀ O ₂
127 (100) C ₈ H ₁₅ O
57 (97) C ₃ H ₅ O

Table -3 ¹³C-NMR data for tricaprylin

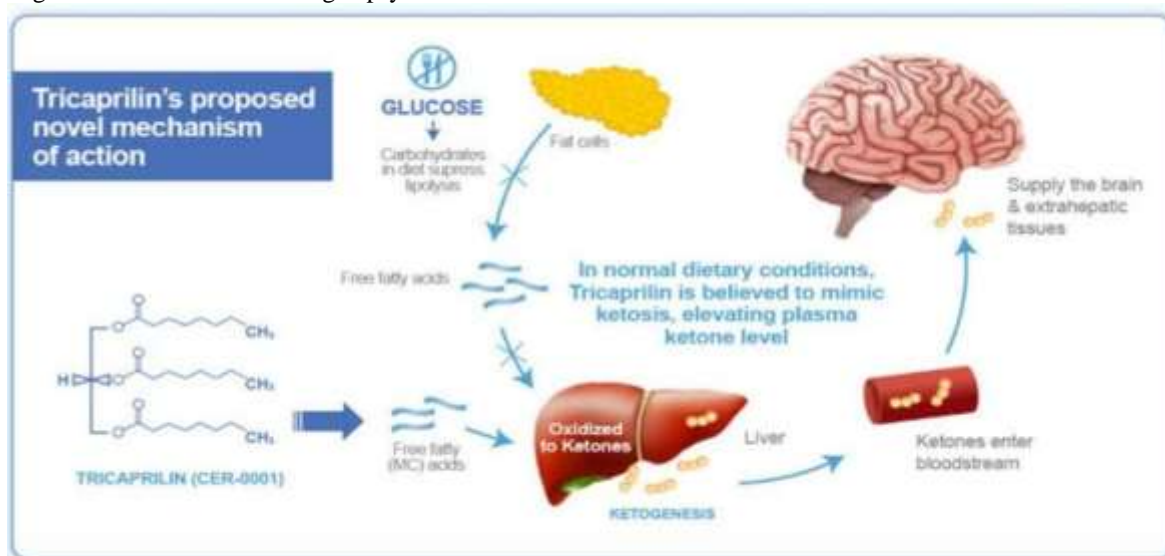
C	TRICAPRYLIN
Glycerol moiety C1 and C3 C2	68.88 62.11
Acyl moiety C1' , and C1''' C1'' C2' , C2'' , C2''' C3' , C3'' , C3''' C4' , C4'' , C4''' C5' , C5'' , C5''' C6' , C6'' , C6'''	173.34 172.92 34.06 31.67 29.07 28.93 24.91

C7', C7'', C7''' C8', C8'', C8'''	22.62 14.07
--------------------------------------	----------------

MECHANISM OF ACTION

[19] Tricaprylin is a type of triglyceride formed from three molecules of caprylic acid combined with a glycerol backbone. It is also known chemically as glyceryl tricaprlylate. The natural compounds that make it up are glycerol, a simple polyol, and caprylic acid, which is an eight-carbon saturated fatty acid. Due to its unique biochemical properties, tricaprylin is extensively utilized in various fields including nutritional supplements, pharmaceuticals, and research. To understand how tricaprylin works, it's important to explore its physiological impacts, metabolism, and structure.[14] Initially, the structure of tricaprylin allows for easy hydrolysis by enzymes. After ingestion, bile acids emulsify tricaprylin in the small intestine, enhancing its surface area for improved enzymatic activity. This is followed by the action of pancreatic lipase, released from the pancreas, which processes tricaprylin. This enzyme specifically targets the ester bonds connecting the glycerol backbone to the caprylic acid chains, breaking tricaprylin down into free caprylic acid molecules and monoglycerides. The lining cells of the gut then absorb the resulting caprylic acid.

[10] Once absorbed, caprylic acid is transported to the liver through the portal vein. In the liver, it undergoes beta-oxidation, a metabolic process that breaks down fatty acids to produce acetyl-CoA. Acetyl-CoA then enters the Krebs cycle to generate ATP, which is the energy currency of the cell. [13] Caprylic acid is metabolized more rapidly due to its medium-chain length compared to long-chain fatty acids, leading to immediate energy production. This unique metabolic pathway is particularly beneficial in clinical situations where rapid energy availability is vital, such as in patients with malabsorption issues or those requiring parenteral nutrition. Research has also examined tricaprylin's potential neurological benefits. Investigations into tricaprylin and other medium-chain triglycerides (MCTs) have looked at their role in hepatic ketogenesis, which is the process through which ketone bodies are synthesized. Ketones can serve as an alternative energy source for the brain, especially in conditions like Alzheimer's where glucose metabolism is impaired. Studies suggest that MCT supplementation, including tricaprylin, may improve cognitive function by providing neuronal cells with an efficient.



FUNCTION AND USES

[3,9] Tricaprylin serves as a carrier for cosmetic formulations as well as for creams and lotions applied topically. It is generally utilized at concentrations ranging from 1-5% to enhance skin texture and facilitate the absorption of other active compounds. It acts as a fragrance component, solvent, and possesses beneficial emollient and skin smoothing properties, functioning as a lipid base that can enhance penetration, typically within the range of 5- 20%. Its low viscosity and non-greasy composition provide excellent spreadability. Because tricapyrylin does not disrupt the skin's natural respiration while being permeable to the skin, it is often used in facial masks, massage oils, and baby oils.[1] It serves as a solubilizer, wetting agent, and binder in color cosmetics, and is an effective dispersant. In two-phase foam baths, tricapyrylin is incorporated as the lipid component, as it mixes easily with natural oils and surfactants. Its compatibility with both organic and inorganic filter agents make it a popular choice in sunscreen oils and creams. Additionally, in some dietary supplements, tricapyrylin may be used at higher concentrations, up to 10%, as a source of medium chain triglycerides (MCTs) for quick energy absorption.

HANDLING PRECAUTIONS

[21]Tricaprylin produces unpleasant smoke and irritating vapours when it breaks down due to heat; it is recommended to ensure proper ventilation to manage any dust or fumes produced from the heated substance; neoprene gloves and safety goggles are recommended for eye protection; and standard safety measures should be adhered which is based on the context and quantity of material being managed.

STABILITY AND STORAGE CONDITIONS

[13] Tricaprylin belongs to the group of stable compounds. It does not react to sound and exhibits strong resistance to oxidation. Cooling is unnecessary even in warm environments. However, it is advisable to avoid exposing it to high temperatures near its flash point (246 °C). Due to its extremely low water content, it is not prone to microbiological activity or hydrolytic degradation. [15,17]Although Tricaprylin is said to decompose into carbon dioxide and carbon monoxide, it will not undergo polymerization. It should be stored at room temperature in well-sealed containers that are protected from light. Suitable packaging materials include glass, metal (aluminium), polypropylene, and high-density polyethylene. Tricaprylin has the

potential to cause certain polymers to swell or become brittle, especially those containing plasticizers.

INCOMPATIBILITY

[12] Tricaprylin is incompatibility with strong oxidizing agents.

FIRST AID MEASURES

[20] EYES: Begin by checking the victim for contact lenses and remove them if they are present. Rinse the victim's eyes with water or normal saline solution for 20 to 30 minutes while concurrently contacting a hospital or poison control centre. Avoid placing any ointments, oils, or medications in the victim's eyes unless specifically directed by a physician. IMMEDIATELY take the victim to a hospital after rinsing the eyes, even if no symptoms such as redness or irritation arise.

[11] SKIN: IMMEDIATELY rinse the affected skin with water while removing and isolating all contaminated clothing. Thoroughly wash all affected skin areas with soap and water. If symptoms such as redness or irritation appear, IMMEDIATELY contact a physician and be ready to take the victim to a hospital for treatment.

[13] INHALATION: IMMEDIATELY exit the contaminated area and take deep breaths of fresh air. If symptoms such as wheezing, coughing, shortness of breath, or burning sensations in the mouth, throat, or chest occur, contact a physician and be ready to transport the victim to a hospital.

[20] INGESTION: DO NOT INDUCE VOMITING. If the victim is conscious and not experiencing convulsions, provide 1 or 2 glasses of water to help dilute the chemical and IMMEDIATELY reach out to a hospital or poison control center. Be prepared to take the victim to a hospital if instructed by a physician. If the victim is convulsing or unconscious, do not give anything by mouth, ensure the airway remains clear, and place the victim on his/her side with the head lower than the body.DO NOT INDUCE VOMITING. IMMEDIATELY take the victim to a hospital.

ADMINISTRATION

[3,8] Axona is administered orally once daily soon after a complete meal. Patients are advised to begin with a gradual dosing schedule for 7 days, or as instructed by their healthcare provider, before consuming one full packet (40 grams) each day. Axona should be mixed with 4 to 8 ounces (118 to 236 millilitres) of water or other beverages and shaken or blended until thoroughly combined. The main component of Axona is a proprietary

formulation that consists of over 95% pure semisynthetic caprylic triglyceride (Tricaprylin). Each 40g packet contains 20 g of Tricaprylin. Route of Administration: Oral (AXONA is a brand name)

SAFETY

[20] The Cosmetic Ingredient Review (CIR) Expert Panel determined that applying tricaprolylin to the skin has not been linked to major irritation in rabbit skin. However, because tricaprolylin acts as a penetration enhancer, it may enable other substances to penetrate more deeply into the skin, potentially increasing their concentration so they can enter the bloodstream.[18] When applied to the eyes, tricaprolylin was observed to cause only mild irritation in rabbits. In animal studies, little to no acute, sub chronic, or chronic toxicity was noted from oral exposure unless the amounts were close to a substantial proportion of caloric intake. Administering subcutaneous injections of tricaprolylin to rats over a span of 5 weeks resulted in a granulomatous reaction.

ADVERSE EFFECT

GASTROINTESTINAL ISSUES: Nausea, Vomiting, Diarrhoea, Abdominal discomfort. **ALLERGIC REACTION:** Skin rashes, Itching, more severe reaction like anaphylaxis. **PANCREATITIS:** Intake of high levels of fats (including those found in triglycerides). **LIVER TOXICITY:** High doses of fats have been linked to liver damage. **FATTY ACID METABOLISM:** Excessive or long term may alter the balance of fatty acid.

EVALUATION

ASSAY

[17] 1. Gas Chromatography (GC): Tricaprylin and other triglycerides are commonly assayed using gas chromatography. Using a chromatographic column, the components (including caprylic acid and other byproducts) are separated and quantified after the sample has been heated. Method: Tricaprylin is injected into the GC system, and the detector detects the fatty acids or triglycerides based on their distinctive response.

[11] 2. High-Performance Liquid Chromatography (HPLC): This method is also used to assay tricaprolylin and is especially helpful in figuring out the amounts of impurities or particular fatty acid components in complicated mixtures. Method: Tricaprylin is dissolved in an appropriate solvent and then run through an HPLC column, where it

separates according to how it interacts with the stationary phase.

[15] 3. Titration (for Free Fatty Acids): Titration is a less popular technique that measures free fatty acids (FFA) that may be present as a result of partial triglyceride hydrolysis.

Method: By neutralizing the free fatty acids with a standard base (like sodium hydroxide), the quantity of free fatty acids is found.

PH

[20] Because of its triglyceride structure, tripartin is a neutral ion-ionizable compound and has a significant PH value of its own. Tricaprylin may interact with basic or acidic substances, depending on the circumstances. Triglycerides may hydrolyze when exposed to strong acids or bases, for instance, separating into fatty acids and glycerol. Depending on the type of fatty acid, this could change the PH.

LOSS ON DRYING

[19] Tricaprylin's drying loss may be influenced by the particular drying conditions (temperature, humidity, and duration, for example). Since tricaprolylin usually contains very little water, drying loss is anticipated to be minimal, usually less than 0.5% in many formulations.

II. CONCLUSION

Three molecules of caprylic acid combine to form the triglyceride known as tricaprolylin. In addition to being an ingredient in cosmetic and skin care products, it is also utilized as a medium chain triglycerides (MCT) oil in food and pharmaceutical products. The body quickly breaks down and absorbs tricaprolylin. Energy conversion of its medium chain fatty acids is easier. Tricaprylin is well-known in skincare products for its emollient qualities, which give the skin a smoother, more hydrated appearance. Tricaprylin's qualities as a solvent and carrier oil also make it useful in the production of some industrial goods. It is generally regarded as safe when added to food or tropical products in the right amounts, but people who are sensitive to fatty acids should exercise caution.

REFERENCES

- [1]. Rowe RC, Sheskey PJ, Quinn ME, editors. Handbook of pharmaceutical excipients. London: Pharmaceutical press; 2006 Jan 30.
- [2]. Brown P, Djerassi C. Electron-impact induced rearrangement reactions of organic molecules. Angewandte Chemie

- International Edition in English. 1967 Jun;6(6):477-96.
- [3]. Budzikiewicz H, Djerassi C, Williams DH. Mass spectrometry of organic compounds. (No Title). 1967.
- [4]. Fauconnot L, Robert F, Villard R, Dionisi F. Chemical synthesis and NMR characterization of structured polyunsaturated triacylglycerols. *Chemistry and physics of lipids*. 2006 Feb 1;139(2):125-36.
- [5]. Vanderveen JE, Glinsmann WH. Fat substitutes: a regulatory perspective. *Annual review of nutrition*. 1992 Jan 1;12:473-87.
- [6]. Xu X. Production of specific-structured triacylglycerols by lipase-catalyzed reactions: a review. *European journal of lipid science and technology*. 2000 Apr;102(4):287-303.
- [7]. Lima JR, Nassu RT. Fat substitutes: Characteristics and applications. *Química Nova*. 1996 Mar 1;19(2):127-34.
- [8]. Foglia TA, Jones KC, Lee K. Synthesis of structured lipids: enzymatic vs. chemical approaches. In 95th Annual Meeting of the American Oil Chemists' Society 2004 May 1 (pp. 13-14).
- [9]. Bach AC, Babayan VK. Medium-chain triglycerides: an update. *The American journal of clinical nutrition*. 1982 Nov 1;36(5):950-62.
- [10]. Charlon N, Bergot P. Rearing system for feeding fish larvae on dry diets. Trial with carp (*Cyprinus carpio* L.) larvae. *Aquaculture*. 1984 Sep 1;41(1):1-9.
- [11]. Craig SR, Gatlin III DM. Coconut oil and beef tallow, but not tricaprilyn, can replace menhaden oil in the diet of red drum (*Sciaenops ocellatus*) without adversely affecting growth or fatty acid composition. *The Journal of nutrition*. 1995 Dec 1;125(12):3041-8.
- [12]. Davis DA, Lazo JP, Arnold CR. Response of juvenile red drum (*Sciaenops ocellatus*) to practical diets supplemented with medium chain triglycerides. *Fish Physiology and Biochemistry*. 1999 Oct;21(3):235-48.
- [13]. Harwood JL, Gurr MI. *Lipid biochemistry: an introduction*. Springer Science & Business Media; 2013 Apr 17.
- [14]. Fontagne S, Geurden I, Escaffre AM, Bergot P. Histological changes induced by dietary phospholipids in intestine and liver of common carp (*Cyprinus carpio* L.) larvae. *Aquaculture*. 1998 Feb 1;161(1-4):213-23.
- [15]. Kanazawa A. Essential fatty acid and lipid requirement of fish. *Nutrition and feeding in fish*. 1985:281-98.
- [16]. Li Z, Ramirez G, Tang R, Paul CK, Nair M, Henderson S, Morimoto B, Liu J, Kaasgaard T, Boyd BJ, Wacker MG. Modeling digestion, absorption, and ketogenesis after administration of tricaprilyn formulations to humans. *European Journal of Pharmaceutics and Biopharmaceutics*. 2023 Jan 1;182:41-52.
- [17]. Selmi B, Gontier E, Ergan F, Barbotin JN, Thomas D. Lipase-catalyzed synthesis of tricaprilyn in a medium solely composed of substrates. *Water production and elimination. Enzyme and microbial technology*. 1997 Apr 1;20(5):322-5.
- [18]. Kapoor M, Gupta MN. Lipase promiscuity and its biochemical applications. *Process Biochemistry*. 2012 Apr 1;47(4):555-69.
- [19]. Malcata FX, Reyes HR, Garcia HS, Hill Jr CG, Amundson CH. Kinetics and mechanisms of reactions catalysed by immobilized lipases. *Enzyme and Microbial Technology*. 1992 Jun 1;14(6):426-46.
- [20]. Chen QH, Fu ML, Liu J, Zhang HF, He GQ, Ruan H. Optimization of ultrasonic-assisted extraction (UAE) of betulin from white birch bark using response surface methodology. *Ultrasonics sonochemistry*. 2009 Jun 1;16(5):599-604.
- [21]. Xiao YM, Wu Q, Cai Y, Lin XF. Ultrasound-accelerated enzymatic synthesis of sugar esters in nonaqueous solvents. *Carbohydrate Research*. 2005 Sep 26;340(13):2097-103.
- [22]. Suganya T, Renganathan S. Optimization and kinetic studies on algal oil extraction from marine macroalgae *Ulva lactuca*. *Bioresource Technology*. 2012 Mar 1;107:319-26.
- [23]. Bashari M, Abbas S, Xu X, Jin Z. Combined of ultrasound irradiation with high hydrostatic pressure (US/HHP) as a new method to improve immobilization of dextranase onto alginate gel. *Ultrasonics sonochemistry*. 2014 Jul 1;21(4):1325-34.
- [24]. Fernandes ML, Saad EB, Meira JA, Ramos LP, Mitchell DA, Krieger N. Esterification and transesterification



- reactions catalysed by addition of fermented solids to organic reaction media. *Journal of Molecular Catalysis B: Enzymatic*. 2007 Jan 2;44(1):8-13.
- [25]. Halldorsson A, Magnusson CD, Haraldsson GG. Chemoenzymatic synthesis of structured triacylglycerols. *Tetrahedron letters*. 2001 Oct 22;42(43):7675-7.