

Company: GreenovateX

CEO: Aditya Singh

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Chemical Formula: Sodium Lauroamphoacetate

Chemical Name: C₁₈H₃₈N₂NaO₃

Use case:

a. What is the use of this compound?

1. Personal Care & Cosmetic Applications

Baby Shampoos & Body Washes – Provides gentle, non-irritating cleansing, reducing skin and eye irritation.

Facial Cleansers & Micellar Waters – Works as a mild foaming agent, removing dirt, oil, and makeup while maintaining moisture.

Shampoos & Conditioners – Enhances foam stability, conditions hair, and reduces harshness when combined with stronger surfactants.

Shaving Creams & Foams – Creates a smooth lather for easy razor glide while minimizing skin irritation.

Bath Foams & Bubble Baths – Boosts foam formation for a long-lasting and luxurious bathing experience.

2. Industrial & Household Applications

Mild Household Cleaners – Provides gentle yet effective cleansing in hand washes and dishwashing liquids, minimizing skin dryness and performing well in hard water.

Textile & Leather Processing – Acts as a wetting agent for uniform dye absorption in textiles and aids in leather softening and conditioning.

Emulsion Polymerization – Functions as an emulsifier and stabilizer in synthetic rubber, plastic, and latex production, ensuring consistency and quality.

b. Are there any alternatives to this compound? Name a few.

- Yes, there are several alternatives to Sodium Lauroamphoacetate that are used in various applications, especially in personal care and cleaning products.

1. Cocamidopropyl Betaine (CAPB)

- **Usage:** Commonly used in shampoos, body washes, and facial cleansers as a foam booster and mild surfactant.

- **Difference:** While both CAPB and Sodium Lauroamphoacetate are amphoteric surfactants, CAPB has stronger viscosity-building properties and is slightly less mild, making it less suitable for ultra-sensitive skin formulations.

2. Sodium Cocoyl Isethionate (SCI)

- **Usage:** A sulfate-free surfactant widely used in cleansing bars, sulfate-free shampoos, and facial cleansers due to its creamy lather and mildness.
- **Difference:** Unlike Sodium Lauroamphoacetate, SCI is **anionic**, meaning it has stronger cleansing power but is less conditioning. It is also more commonly used in solid formulations rather than liquid ones.

3. Decyl Glucoside

- **Usage:** A **non-ionic** surfactant derived from plant sources, often found in baby care products, sulfate-free shampoos, and eco-friendly household cleaners.
- **Difference:** Compared to Sodium Lauroamphoacetate, Decyl Glucoside has lower foaming ability but superior biodegradability and is often preferred for **natural and organic** formulations.

c. Why this compound is superior to its alternatives?

Sodium Lauroamphoacetate stands out due to its unique balance of **mildness, foaming ability, compatibility with other surfactants, and eco-friendliness**. Compared to alternatives like **Cocamidopropyl Betaine (CAPB)**, **Sodium Cocoyl Isethionate (SCI)**, and **Decyl Glucoside**, it offers several advantages, making it a preferred choice in personal care and household formulations.

1. Exceptionally Mild & Non-Irritating

Unlike **Cocamidopropyl Betaine (CAPB)**, which can cause skin sensitivity due to impurities like **dimethylaminopropylamine (DMAPA)**, Sodium Lauroamphoacetate is far gentler.

Ideal for **baby care, sensitive skin, and sulfate-free formulations** due to its minimal irritation properties.

2. Balanced Foaming & Cleansing

Compared to **Sodium Cocoyl Isethionate (SCI)**, which produces a rich lather but has **low water solubility**, Sodium Lauroamphoacetate forms a **stable, moderate foam** in both **liquid and solid formulations**.

Enhances **cleansing efficiency** without excessive dryness.

3. Better Compatibility with Other Surfactants

- Unlike **Decyl Glucoside**, which has **limited foaming capacity**, Sodium Lauroamphoacetate **works synergistically** with both **anionic (e.g., SLS) and non-ionic surfactants** to improve performance while minimizing irritation.
- Allows for **gentler formulations** with effective cleansing.

4. Biodegradable & Eco-Friendly

- Similar to **Decyl Glucoside and SCI**, it is **biodegradable**, but it also offers superior **conditioning properties**, making it ideal for both **personal care and household cleaning products**.
 - Aligns with **sustainable beauty trends** and environmental concerns.
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5. Market Superiority & Growing Demand

Rising Demand for Sulfate-Free Products – Consumers prefer **sulfate-free surfactants** to avoid skin irritation in shampoos, body washes, and facial cleansers.

Clean Beauty & Natural Ingredients Trend – Derived from **coconut oil**, it fits the trend of **organic, eco-friendly beauty** with **gentle cleansing properties**.

Personal Care & Cosmetics Industry Growth – The **beauty industry boom** in **Asia Pacific & North America** fuels the demand for **mild, sulfate-free surfactants**.

Sustainability & Eco-Friendly Focus – Brands prefer **biodegradable, sustainable ingredients**, making **Sodium Lauroamphoacetate** an **attractive choice** for green formulations.

Regulatory & Ethical Influences – Stricter **regulations** and demand for **cruelty-free, vegan, and hypoallergenic** products boost its **global market presence**.

d. Is this compound imported in India? What is the magnitude of imports?

Yes, Sodium Lauroamphoacetate is imported into India. The magnitude of imports is as follows:

1. Total Import Data:

- Total Value: \$156,396

- Total Quantity Imported: 58,330 units
- Average Price per Unit: \$2.68
- Average Value per Shipment: \$5,792

2. Source Countries:

- Thailand: \$155,977 (Major supplier)
- China: \$419 (Minor supplier)

3. Major Port of Entry:

- Nhava Sheva Port (Jawaharlal Nehru Port, Maharashtra) – Largest Container Port in India
- Delhi Air Cargo – Small volume imports

Economic feasibility:

- a. What input raw materials are needed for its synthesis (same as reported in the Patent application)?
 - Sodium Lauroamphoacetate is synthesized through a **two-step process** involving the reaction of **lauric acid, aminoethylethanolamine (AEEA), and sodium chloroacetate**. The key raw materials used in its production are:

1. Lauric Acid (C₁₂H₂₄O₂)

Source: Derived from coconut oil or palm kernel oil.

Role: Acts as the **hydrophobic fatty acid component**, forming the surfactant's **lipophilic tail**.

Reaction: In the **first step**, lauric acid reacts with AEEA to form an **amide intermediate**.

2. Aminoethylethanolamine (AEEA) (C₄H₁₂N₂O)

Role: Provides the **hydrophilic amine group** necessary for the formation of the imidazoline ring.

Reaction: Reacts with lauric acid to form an **amide intermediate**, which undergoes **cyclization** upon heating to generate an **imidazoline structure**.

3. Sodium Chloroacetate (C₂H₂ClNaO₂)

Role: Introduces the **zwitterionic carboxylate (-COO⁻) group**, which makes the compound a **mild amphoteric surfactant**.

Reaction: The imidazoline structure reacts with **one equivalent** of sodium chloroacetate to form **sodium lauroamphoacetate**.

If **two equivalents** are used, the **di-acetate form** (Di-Sodium Lauroamphoacetate) is obtained.

- b. Provide preliminary economic feasibility based on cost of raw materials, solvents and product selling price.

Preliminary Economic Feasibility Analysis of Aminoethyl Ethanolamine (AEEA)

Import Data for Aminoethyl Ethanolamine (AEEA)

- **Total Value of Imports in India:** \$616,801
- **Total Quantity Imported:** 238,400 units
- **Average Price per Unit:** \$2.59
- **Average Value per Shipment:** \$41,120
- **Top Supplier:** Sweden (Total value: \$616,801)
- **Top Port of Discharge:** Nhava Sheva Sea (\$616,801)

Economic Feasibility Considerations

1. Raw Material Costs:

- The unit price of **AEEA is \$2.59**, which is significantly **higher** compared to other raw materials.
- The **costly nature of AEEA** indicates it may be a **critical input** in the production process.

2. Supply Chain & Logistics:

- **Major Supplier: Sweden**, meaning **dependency on a single country** for imports.
- **Port of Discharge: Nhava Sheva Sea**, which is India's **largest container port**, ensuring **reliable import logistics**.
- **High-value shipments (\$41,120 avg.)** suggest bulk procurement to minimize costs.

3. Product Pricing & Market Viability:

- If the final **product selling price** is **significantly higher** than the cost of raw materials (AEEA + others), then **profitability is feasible**.
- The **high unit price** suggests AEEA is likely used in specialized chemical or industrial applications, meaning the **market should support premium pricing**.

Preliminary Economic Feasibility Analysis of Lauric Acid

Import Data for Lauric Acid

- **Total Value of Imports in India:** \$181,419,670
- **Total Quantity Imported:** 153,272,638 units
- **Average Price per Unit:** \$1.18
- **Average Value per Shipment:** \$55,446

Supply Chain & Logistics

- **Top Suppliers:**
 - Malaysia: **\$108,600,371**
 - Indonesia: **\$72,524,566**
 - Germany: **\$124,331**
 - **Top Ports of Discharge:**
 - Nhava Sheva Sea: **\$74,817,018**
 - Chennai Sea: **\$45,525,821**
 - Ludhiana: **\$31,102,405**
 - **Ports of Loading:**
 - Jawaharlal Nehru Port
 - Salalah Port
 - Mundra
 - Cagliari
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Economic Feasibility Considerations

1. Raw Material Costs:

- The unit price of **Lauric Acid is \$1.18**, which is **moderate** compared to other imported materials like AEEA (\$2.59) but higher than Sodium Acetate (~\$0.23).
- This suggests Lauric Acid is a relatively **valuable** but **affordable** input.

2. Supply Chain & Logistics Efficiency:

- **Diversified supplier base** with major contributions from **Malaysia and Indonesia**, reducing dependency on a single country.
- **Multiple ports of discharge** (Nhava Sheva, Chennai, Ludhiana) ensure **distribution flexibility**, reducing bottlenecks.
- **Multiple loading ports** (Jawaharlal Nehru, Salalah, Mundra, Cagliari) indicate **well-established global trade routes**, minimizing transportation risks.

3. Market Viability & Demand:

- **High import value (~\$181 million)** suggests **strong domestic demand**, making it a **commercially viable product**.
- Lauric Acid is widely used in **cosmetics, detergents, and pharmaceuticals**, which are **high-demand industries** in India.

4. Cost Comparison with Other Raw Materials:

- **Sodium Acetate:** \$0.23/unit
- **Aminoethyl Ethanolamine (AEEA):** \$2.59/unit
- **Lauric Acid:** \$1.18/unit → **Mid-range cost**, making it **economically viable**

References: Provide references/web links for your data.

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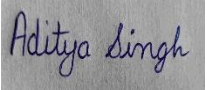
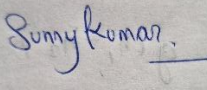
List the contributions of each author: Sunny Kumar

- Designed and implemented the use case analysis of Sodium Lauroamphoacetate, detailing its applications in personal care, cosmetics, and industrial uses.
- Conducted a comparative analysis of Sodium Lauroamphoacetate with alternative compounds, highlighting its superior qualities such as mildness, foaming ability, compatibility with other surfactants, and eco-friendliness.
- Provided insights into market trends, including the growing demand for sulphate-free and sustainable products, and aligned the findings with industry standards.

List the contributions of each author: Divyansh Gupta

- Designed and implemented the economic feasibility analysis of Sodium Lauroamphoacetate, including raw material cost analysis, supply chain logistics, and market viability assessment.
- Researched and analysed import data for key raw materials like Aminoethyl Ethanolamine (AEEA) and Lauric Acid, evaluating their cost and availability.
- Provided a preliminary economic feasibility assessment based on raw material costs, solvents, and the potential selling price of the product, ensuring alignment with company goals and market demand.

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