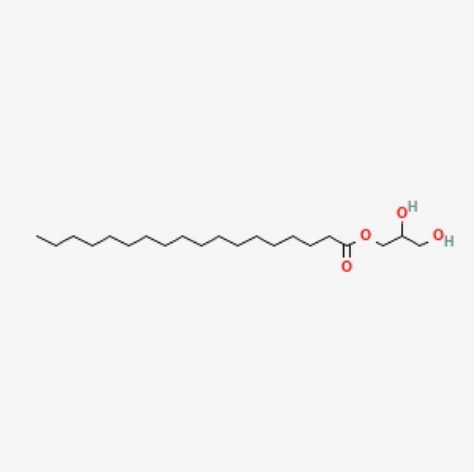
Distilled Monoglyceride

Basic Information



Distilled Monoglyceride Structure

Product Type	**: Distilled Glycerol Mono-Fatty Acid Ester (Food Emulsifier)**
CAS Number	**: 123-94-4**
HS Code	**: 2915-70-90**
E-Number	**: E471**
Fatty Acid Source	**: Palm oil or palm-based vegetable oils**
Synonyms	**: DMG, Distilled Monoglyceride, Glycerol Monoester, Glycerol Mono Fatty Acid Ester**
Grade	**: Food Grade (Kosher/Halal available)**

Description

Distilled monoglyceride (DMG) is a glycerol monoester of fatty acids, produced by the glycerolysis of fats and oils followed by molecular distillation to achieve a high monoglyceride content (typically >90%). It is one of the most widely used food emulsifiers globally.

DMG functions as an emulsifier, stabilizer, and anti-staling agent. In food applications it creates stable emulsions, improves texture in baked goods, extends shelf life, and prevents starch retrogradation. It is also used in margarine, ice cream, and confectionery.

In non-food applications, it is used in personal care products and as an industrial emulsifier.

Technical Specifications

Appearance	**White to off-white powder, beads, or flakes**
Odor	**Faint, characteristic fatty odor**
Monoglyceride Content (GC)	**Min. 90% (distilled grade)**
Free Glycerol	**Max. 1.0%**
Free Fatty Acid (as oleic)	**Max. 1.5%**
Acid Value	**Max. 3.0 mg KOH/g**
Iodine Value	**Typically 3–5 g I?/100g (palm-based saturated grade)**
Saponification Value	**155–175 mg KOH/g**
Melting Point	**54–72 °C (depending on fatty acid composition)**
HLB Value	**Approx. 3.5–4.5 (lipophilic emulsifier)**
Moisture	**Max. 0.5%**
Color (Gardner)	**Max. 2**
Density	**Approx. 0.97 g/cm³**

Flash Point	**>200 °C**

Uses and Manufacturing

Uses
Distilled monoglyceride is one of the most widely used food emulsifiers in the world, approved under E471 in the EU and GRAS in the USA. In bread and bakery products, DMG is used as a dough conditioner and anti-staling agent. It complexes with amylose (the linear starch fraction) to form inclusion complexes, which retard starch retrogradation (staling) and extend shelf life of bread and cakes. Typical use levels are 0.3–0.5% on flour weight.
In margarine and shortening, DMG functions as an alpha-tending emulsifier, promoting stable beta-prime crystal formation in the fat phase, resulting in smooth, plastically consistent margarine products. In puff pastry shortenings, DMG contributes to better lamination and volume.
In ice cream and frozen desserts, DMG controls the rate of fat destabilization (fat agglomeration) during freezing, improving overrun, texture, and heat-shock resistance. In chocolate and compound coatings, DMG acts as a viscosity modifier when used together with lecithin.
In instant noodles and pasta, DMG functions as a dough conditioner that reduces stickiness and improves cooking quality. Other food applications include powdered products (anti-caking), chewing gum (softener/plasticizer), and low-calorie food emulsification.
Non-food applications include use in personal care products as a self-emulsifying base ingredient, in PVC processing as a lubricant and anti-static agent, and in technical textile applications as a softening agent.
Methods of Manufacturing
Distilled monoglyceride is produced by glycerolysis of vegetable oils (typically palm oil, palm stearin, or partially hydrogenated oils) with excess glycerol at elevated temperature (220–260 °C) in the presence of an alkaline catalyst (sodium hydroxide or calcium oxide). The reaction produces a mixture of approximately 40–50% monoglycerides, 40–50% diglycerides, 5–10% triglycerides, and free glycerol.
To obtain the high-purity distilled grade (>90% monoglyceride), the crude glycerolysis product is subjected to short-path molecular distillation under high vacuum (typically <0.001 mbar) at temperatures of 180–220 °C. Under these conditions, the more volatile monoglycerides are separated from the heavier diglycerides and triglycerides.
The distilled DMG product is then cooled, formed into beads, flakes, or powder, and tested for quality against food-grade specifications. Kosher and Halal certification requires use of vegetable-based oils only (no tallow). Quality parameters include monoglyceride content (GC), free fatty acid, free glycerol, acid value, iodine value, moisture, and color.

Hazard Identification

Hazard Summary
Low toxicity. Approved as food additive (E471). May cause mild irritation on excessive contact.
Fire Hazard
Combustible solid with high flash point.
Skin, Eye & Respiratory Irritations
Dust may cause mild respiratory irritation. Eye and skin irritation unlikely at normal handling.

Safety and First Aid

Physical Dangers
Combustible solid.
Skin First Aid
Wash with soap and water.
Eye First Aid
Rinse with water.

Ingestion First Aid
Generally safe as food additive. Seek advice if large non-food quantities are ingested.
Fire Fighting Procedures
Use CO?, foam, or dry powder extinguisher.

Handling and Storage

Nonfire Spill Response
Small spill (powder/beads): Vacuum or carefully sweep up. Avoid dust generation. Collect in labeled containers for disposal or recovery.
Molten spill: Allow material to cool and solidify before collection. Scrape up solidified material. Do not allow molten product to enter drains. Warn of slip hazard. Clean residual with hot water and detergent.
Safe Storage
Store in original, tightly sealed packaging in a cool, dry, well-ventilated warehouse. Protect from heat, humidity, and direct sunlight. High humidity can cause caking and hydrolysis of the product. Keep away from oxidizing agents and strong acids/bases. For bulk melt storage, maintain at 65–75 °C under inert atmosphere.
Storage Conditions
Recommended storage temperature: 15–25 °C (solid/powder/bead form). Melt storage: 65–75 °C. Relative humidity: below 60%. Shelf life: 18–24 months in original sealed packaging. Suitable containers: multi-wall kraft paper bags (with PE liner), HDPE drums, stainless steel tanks (for melt). Protect from moisture. Store away from food-grade incompatibles and strong odor sources.