Palm Oil

Basic Information

Palm Oil Structure

Product Type	**Refined, Bleached, Deodorized (RBD) Vegetable Oil**
CAS Number	**8002-75-3**
HS Code	**1511.10 (Crude) / 1511.90 (Refined)**
Origin	**Elaeis guineensis (Oil Palm Fruit Mesocarp)**
Main Fatty Acids	**Palmitic (C16:0): 39–47%; Oleic (C18:1): 36–44%**
Synonyms	**Palm oil, RBD Palm Oil, CPO (Crude), African palm oil**
Grade	**Crude (CPO) / RBD Palm Oil**

Description

Palm oil is a vegetable oil extracted from the mesocarp (reddish pulp) of the fruit of the oil palm, Elaeis guineensis. It is the most widely produced vegetable oil in the world, with major production in Indonesia and Malaysia.
Crude palm oil (CPO) has a distinctive reddish-orange color due to its high content of carotenoids, particularly beta-carotene. Refined palm oil is used extensively in food manufacturing, while the oil is also an important feedstock for oleochemicals.
Palm oil is unique among vegetable oils in containing approximately equal proportions of saturated (mainly palmitic acid, C16:0) and unsaturated (mainly oleic acid, C18:1) fatty acids. This composition gives it excellent stability and versatility.

Technical Specifications

Appearance	**Semi-solid fat at room temperature; reddish-orange (CPO) or pale yellow to white (RBD)**
Color (CPO)	**Reddish-orange; ?-carotene content typically 500–700 ppm**
Color (RBD, Lovibond 5.25")	**Max. 3.0 Red**
Odor & Taste	**Bland, characteristic (RBD); strong, characteristic (CPO)**
Free Fatty Acid (FFA as palmitic)	**Max. 5% (CPO); Max. 0.1% (RBD)**
Moisture & Impurities	**Max. 0.25% (CPO); Max. 0.1% (RBD)**
Iodine Value (Wijs)	**50–55 g I?/100g**
Saponification Value	**190–205 mg KOH/g**
Peroxide Value	**Max. 5 meq O?/kg (fresh RBD)**
Slip Melting Point	**33–39 °C**
Cloud Point	**Approx. 20–24 °C**
Density (at 50 °C)	**Approx. 0.891 g/cm³**
Refractive Index (at 40 °C)	**1.454–1.456**
Unsaponifiable Matter	**Max. 1.2%**
Flash Point	**>250 °C**

Uses and Manufacturing

Uses

Palm oil is the world's most consumed vegetable oil and has a vast range of food and non-food applications. In the food industry, palm oil is used in cooking oil, frying oil, margarine, shortening, and as a fat ingredient in baked goods (biscuits, cakes, pastry), snack foods, instant noodles, chocolate and confectionery coatings, dairy analogs, and processed meats. Its semi-solid nature at room temperature and high stability to oxidation (oxidative stability index, OSI, typically 40–60 hours) make it a preferred choice for frying applications, replacing partially hydrogenated vegetable oils (trans fat sources).
Palm oil fractions are produced by dry fractionation: palm olein (liquid fraction, iodine value >56) for bottled cooking oil and frying applications, and palm stearin (solid fraction, high palmitic acid content) for margarine, shortening, specialty fats, and industrial use.
In the oleochemical industry, palm oil serves as the primary feedstock for the production of fatty acids (particularly palmitic and stearic acid via fat splitting and distillation), fatty alcohols (cetyl and stearyl alcohol via hydrogenation), soap noodles (saponification), glycerine, biodiesel, and various fatty acid esters. The non-food oleochemical products derived from palm oil find their way into detergents, surfactants, lubricants, plasticizers, candles, and personal care products.
In the energy sector, palm oil is used directly as a biofuel and as a feedstock for biodiesel (FAME — fatty acid methyl esters) production. Palm oil-based biodiesel is commercially produced and blended with petroleum diesel in many Asian and European countries.

Methods of Manufacturing

Palm oil production begins with the harvesting of fresh fruit bunches (FFB) from oil palm plantations. FFBs are transported to the palm oil mill where they are sterilized with steam to inactivate lipase enzymes (preventing FFA increase), then threshed to separate individual fruits from the bunch.
The sterilized fruits are pressed in screw or hydraulic presses to extract crude palm oil (CPO), which is then clarified to remove water and impurities. CPO is the primary traded commodity (typically >95% triglycerides, with FFA 5%).
Refining of CPO to RBD (Refined, Bleached, Deodorized) palm oil involves degumming (removal of phospholipids), neutralization/deacidification (removal of FFAs by alkali washing or steam stripping), bleaching (removal of carotenoids and other pigments with activated clay/carbon), and deodorization (removal of volatile flavor and odor compounds by steam stripping under vacuum at 240–270 °C).
Fractionation of RBD palm oil into olein and stearin is achieved by controlled crystallization at defined temperatures, followed by filtration.

Hazard Identification

Hazard Summary

Low hazard profile. Not classified as a dangerous substance. Combustible at elevated temperatures.

Fire Hazard

Combustible. High flash point (>250 °C) reduces fire risk under normal conditions.

Skin, Eye & Respiratory Irritations

Non-irritating under normal handling conditions.

Safety and First Aid

Physical Dangers

Combustible fat at elevated temperatures. Heated oil may cause burns.

Skin First Aid

Wash with soap and water if desired. Treat burns from hot oil with cool running water.

Eye First Aid

Rinse with water if contact occurs.

Ingestion First Aid

Generally safe as food; seek medical advice if large amounts of heated product are ingested.

Fire Fighting Procedures

Use CO?, foam, or dry powder. Burning oil fires: use Class F/K extinguisher or fine water mist.

Handling and Storage

Nonfire Spill Response

Small spill: Absorb with sand, sawdust, or commercial absorbent. Collect in labeled waste containers. Warn personnel — oil on floors creates a serious slip hazard.
Large spill: Contain with bunds or absorbent barriers. Do not allow to enter waterways or drains. Pump or scoop liquid oil into recovery containers. Clean residual with hot detergent solution or commercial degreaser. Dispose of oil-contaminated materials in accordance with local environmental regulations.

Safe Storage

Store in tanks or containers made of stainless steel, mild steel (lined), or HDPE. Avoid copper, brass, and bronze which catalyze oxidative rancidity. Maintain product above melting point (35–40 °C for RBD palm oil) to keep liquid. Protect from contact with air, light, and moisture to prevent oxidative rancidity. Nitrogen blanketing is strongly recommended for bulk storage to extend shelf life. Keep away from strong oxidizing agents and heat sources above 60 °C.

Storage Conditions

Recommended storage temperature: 40–50 °C (liquid, above melting point). Do not superheat above 60 °C for extended periods. Shelf life: 6–12 months from production date under proper conditions (nitrogen blanket, dark storage). Suitable containers: stainless steel 304/316 tanks, mild steel (internally lined/coated), HDPE tanks. Avoid storage near strong-smelling chemicals as palm oil can absorb odors. For solid/semi-solid storage, maintain at 25–30 °C. Conduct regular sampling and peroxide value monitoring.