Palm oil and its fractions

SD Guthrie International

Chemistry, properties & applications

Palm oil is an edible vegetable oil extracted from the mesocarp (flesh) of the fruit of the oil palm (Elaeis guineensis). We refine and fractionate it into a versatile family of oils and fats, delivering the quality, consistency and traceability our customers build their products on.

- **High Yield**
- **Oxidative Stability**
- **No Trans Fats**
- **Versatile Applications**

01 What is palm oil?

Palm oil is one of the world's most widely used edible oils, valued for its high yield, stability, and versatility. Our traceable value chain takes it from freshly harvested fruit to RSPO-certified sustainable oil.


Fresh fruit bunch


Fruit


Mesocarp (flesh)


Palm oil

02 Fatty acid composition of palm oil

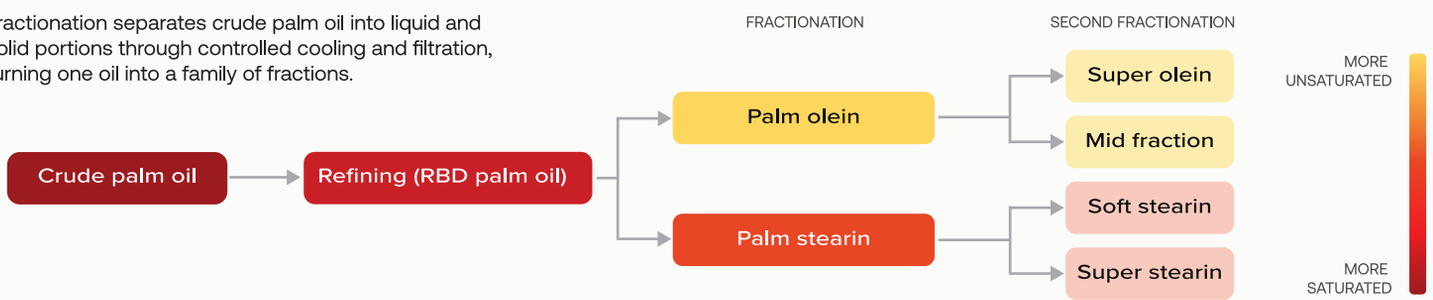
FATTY ACID	CARBON STRUCTURE	APPROX. %	PROPERTY
Myristic Acid	C14 : 0	0.5 - 1.5%	Saturated
Palmitic Acid	C16 : 0	40 - 45%	Saturated, increased hardness
Stearic Acid	C18 : 0	4 - 5%	Saturated
Oleic Acid	C18 : 1	38 - 44%	Mono unsaturated, improves stability
Linoleic Acid	C18 : 2	8 - 11%	Polyunsaturated

TYPICAL CHARACTERISTICS OF PALM OIL

Melting Point **33 - 39 °C**	Iodine Value **50 - 55**
Saponification Value **190 - 209 mg KOH/g**	Density (40°C) **0.89 g/cm³**

03 Palm oil fractionation

Fractionation separates crude palm oil into liquid and solid portions through controlled cooling and filtration, turning one oil into a family of fractions.



04 Palm olein

- Rich in oleic acid
- Excellent oxidative stability

APPLICATIONS

Cooking oil · Salad oil · Deep frying · Margarine blends · Snack food

05 Palm stearin

- Semi-solid to solid
- Higher palmitic acid component
- High solid fat content (SFC)

APPLICATIONS

Bakery shortening · Vanaspati · Soap making · Margarine · Confectionery fats · Savoury

06 Palm super olein

- Very clear liquid
- Higher oleic acid
- Lower cloud point
- Excellent cold stability

APPLICATIONS

Premium cooking oil · Frying applications

07 Palm mid fraction

- Rich in symmetrical triglycerides (POP, POS)
- Excellent crystallisation properties
- Excellent melting behaviour

APPLICATIONS

Confectionery fats · Filling fats

SD GUTHRIE INTERNATIONAL - NOT ALL PALM OIL IS CREATED EQUAL.

08 Palm soft stearin

- Second fraction from palm stearin
- Semi-solid with moderate palmitic acid content
- Moderate SFC

APPLICATIONS

- Margarine blends
- Shortening systems
- Bakery fats

09 Palm super stearin

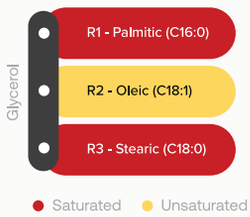
- Most saturated fraction
- Very hard and brittle at room temperature
- Very high SFC

APPLICATIONS

- Hardstocks for margarine
- Confectionery coating
- Cocoa butter equivalents

10 Chemistry of palm oil (triacylglycerols)

Palm oil is composed mainly of triacylglycerols (TAGs), a glycerol backbone esterified with three fatty acid chains, R1, R2, and R3, each of which may be saturated or unsaturated.



EXAMPLE FATTY ACID STRUCTURE

Palmitic Acid (C16:0)
Stearic Acid (C18:0)
Oleic Acid (C18:1)
Linoleic Acid (C18:2)

More double bonds lower the melting point. This is why oleic- and linoleic-rich fractions stay liquid while palmitic-rich fractions solidify.

11 Comparison of palm oil fractions

PROPERTY	PALM OIL	PALM OLEIN	PALM STEARIN	SUPER OLEIN	PALM MID FRACTION	SOFT STEARIN	SUPER STEARIN
Physical State	Semi-solid	Liquid	Solid	Liquid	Semi-solid	Semi-solid	Solid (hard)
Melting Point (°C)	33 - 39	18 - 24	44 - 56	15 - 20	32 - 37	47 - 53	55 - 60
Saturated Fat	Medium	Lower	Higher	Lowest	High	Higher	Highest
Iodine Value	50 - 55	56 - 60	28 - 40	60 - 70	40 - 46	38 - 42	10 - 16
Oxidative Stability	High	High	Very high	High	High	Very High	Very High
Main Uses	General purpose	Cooking and frying	Bakery	Frying	Chocolate confectionery	Margarine, Shortening	Hardstocks

PROPERTY	EXPLANATION
Physical State	Shows whether the fat is liquid, semi-solid, or solid at room temperature, which helps determine how the fat behaves during processing and in the final product.
Melting Point (°C)	Shows the temperature range at which the fat melts, which helps predict texture, mouthfeel, processing behavior, and suitability for applications such as frying, bakery, or confectionery.
Saturated Fat	Shows the relative amount of saturated fatty acids, which influences hardness, melting behavior, oxidative stability, and nutritional composition.
Iodine Value	Measures the degree of unsaturation in the fat, where a higher value generally indicates a softer or more liquid fat and a lower value a harder, more saturated fat.
Oxidative Stability	Shows how resistant the fat is to oxidation, which helps predict shelf life and the risk of developing rancid flavors and odors.

12 Quality parameters of palm oil

Free Fatty Acids
FFA (as palmitic) ≤ 0.1%

Peroxide Value
PV ≤ 1.0 meq O_2/kg

Slip Melting Point
SMP = 33–39°C

Saponification Value
SV = 190–209 mg KOH/g

Moisture & Impurities
M&I ≤ 0.05%

Iodine Value
IV = 50–55 (RBD palm oil)

Colour (Lovibond)
5.25" R ≤ 4.0 R

Oxidative Stability Index
OSI (at 110°C) ≥ 25 hours

13 Advantages of palm oil

- √ Up to 2–3× longer fry life vs. sunflower oil
- √ Naturally free of trans fats
- √ 5–10× higher oil yield per hectare than any other oil crop
- √ Suitable for a wide range of applications
- √ Highest natural source of vitamin E tocotrienols among edible oils

All values to be confirmed and validated by the quality assurance team against current product specifications.

Let's align on specifications, documentation and timelines.

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