

COD OIL



SINCE 1938

Most types of cod oil from LYSI are categorised as food supplements. Cod oil is frequently blended with other oils, some of which are defined as APIs (active pharmaceutical ingredients). Pharmaceutical companies use APIs as the key ingredients in the manufacturing of medicines. LYSI API oils and relevant documents fulfil all requirements made by national regulatory bodies for the registration of medicines.

Cod oil is, like other fish oils, a complex mixture of triacylglycerols (also called triglycerides) and trace components. What sets it apart from most other fish oils is the fatty acid profile, which is very similar to that of cod liver oil.

The oil is extracted by physical means from whole fresh blue whiting (*Micromesistius poutassou*) and related Gadidae species that are caught in the North-East Atlantic Ocean. The catches come from fish stocks that are under strict control.

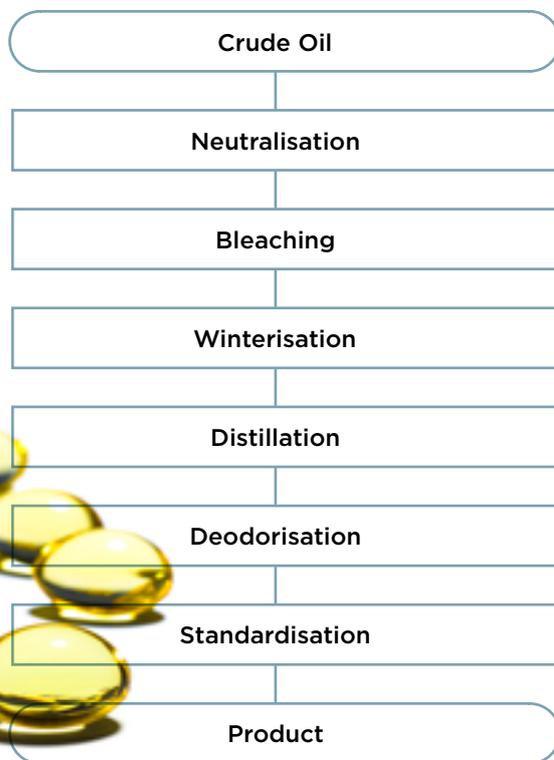
LYSI purchases crude cod oil from Icelandic plants. The crude oil is fully refined in LYSI's state-of-the-art refinery in Reykjavik, Iceland.

LYSI is a major producer of cod oil.

The Refining Process

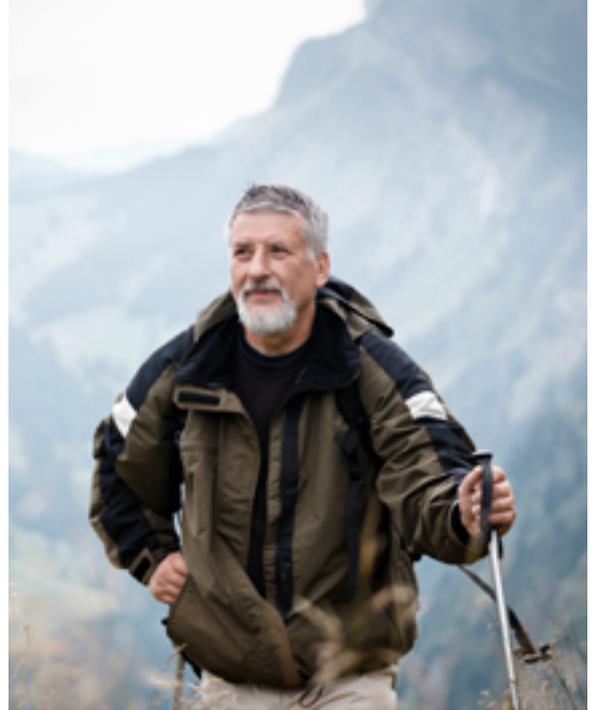
Crude cod oil is not suited for direct consumption and must be refined before use. The refining process removes unwanted components such as free fatty acids, pigments, contaminants and various other substances that can impart fishy flavour or off-flavour to the oil.

The refining process of cod oil is comprised of 5 or 6 steps, as outlined below. Distillation (short-path) is not always called for. During the standardisation process, vitamins are added as required.



It is imperative that the products we consume are clean and that they meet the most stringent international demands issued by health authorities. This is secured through elaborate and comprehensive production processes in the LYSI refinery. The equipment used for refining is custom-made, built on the extensive knowledge of fish oil refining obtained over the last 80 years. The key processes have been validated and approved.

The company is FSSC 22000 certified and GMP approved. FSSC 22000 is a food safety scheme that is fully recognised by the Global Food Safety Initiative (GFSI).



Technical Aspects

The composition of cod oil is not defined in the European Pharmacopoeia and the USP, but it is very similar to the composition of cod liver oil, as is shown in the table on opposite page.

Some LYSI cod oil products are blends of cod oil from the Gadide family and other oils, most commonly cod liver oil. This is always clearly defined in the product specifications.

Every batch of cod oil produced at LYSI is analysed per specification. A certificate of analysis is issued for every batch.

Properties of Cod Oil

Cod oil is a relatively recent addition to the LYSI product portfolio. Its main use is a surrogate for cod liver oil or in blends with cod liver oil.

Cod oil is a good source of the omega-3 fatty acids EPA and DHA. These fatty acids are often considered essential due to their low conversion efficiency from alpha-linolenic acid.

Cod oil may be taken orally as a liquid or in capsule form.

EPA and DHA have been extensively studied for the last three decades and their different effects on the body have been described.



Initial studies on the physiological effects of long-chain omega-3 fatty acids focused on the relationship between EPA and DHA and cardiovascular disease. The findings showed that both the acids reduced the risk of cardiovascular disease (Casula, et al., 2013) (de Oliveira Otto, et al., 2013) (Zock, et al., 2016).

A deficiency of omega-3 fatty acids has been implicated as a risk factor in mental disorders such as depression, schizophrenia and ADHD (McNamara, 2016) (Parletta, et al., 2016) (Königs & Kiliaan, 2016).

Reports dating from the 18th century show that people used cod liver oil to reduce symptoms of arthritis. This appears to have been demonstrated by more recent research. Omega-3

polyunsaturated fatty acids have been shown to contain anti-inflammatory properties. These acids play a role in arthritis and possibly other conditions associated with inflammation (Yates, et al., 2014) (Calder, 2015) (Khatib, et al., 2016).

A number of recommended intakes of EPA and DHA have been published. Health claims authorised by the EU give daily intakes from 250 mg to 3 g EPA+DHA, depending on the claim. For example, the beneficial effect to normal heart function is obtained with 250 mg of EPA and DHA, but the beneficial effect to maintenance of normal blood pressure is obtained with 3 g of EPA and DHA. In comparison LYSI cod oil normally contains 175 mg EPA+DHA/g.

Parameters:	LYSI Cod Liver Oil	LYSI Cod Oil
Vitamin A (µg/g)	-	-
Vitamin D ₃ (µg/g)	-	-
EPA, area %	8-10	7-12
DHA, area %	11-13	8-14
Acid value (mg KOH/g)	< 0.5	< 0.5
Iodine value (g I/100 g)	150-165	140-170
Unsaponifiable matter (%)	0.6-1.0	0.6-1.4
Refractive index at 20°C	1.478-1.480	1.477-1.480
Cold test; remains clear at 0°C (hours)	> 3	> 3
Peroxide value (meq. O ₂ /kg)	1-5	1-5
Anisidine value	5-10	7-15
Saponification value (mg KOH/g)	182-190	-
Relative density at 20°C	0.923	-

Product Groups

Cod oil from LYSI falls into two groups, pure cod oil and cod oil blends.

Pure cod oil

Fully refined cod oil is produced to fulfil LYSI's many different specifications. The specifications can be generic or determined in collaboration with customers in terms of individual requirements.

Other ingredients can be added, such as vitamins, antioxidants and flavourings. Mixed tocopherols are used as antioxidants. Flavourings include lemon, orange, lemon-mint, strawberry and tutti-frutti.

All ingredients/additives must be non-GMO, non-irradiated and preferably, Halal-certified.

Cod oil blends

LYSI offers a range of blended cod oil products. Most common are cod liver oil blends. Again, the specifications can be generic or determined with customers. Cod liver oil blends must contain at least 51% of cod liver oil.

The cod oil blends can contain added ingredients, similar to the pure cod oil.

The products are packed into steel drums, IBCs, tankcontainers or flexicontainers, all according to customer requirements.



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