

INTERNATIONAL OLIVE COUNCIL (IOC) and CALIFORNIA TRADE STANDARDS for OLIVE OIL

Paul Vossen

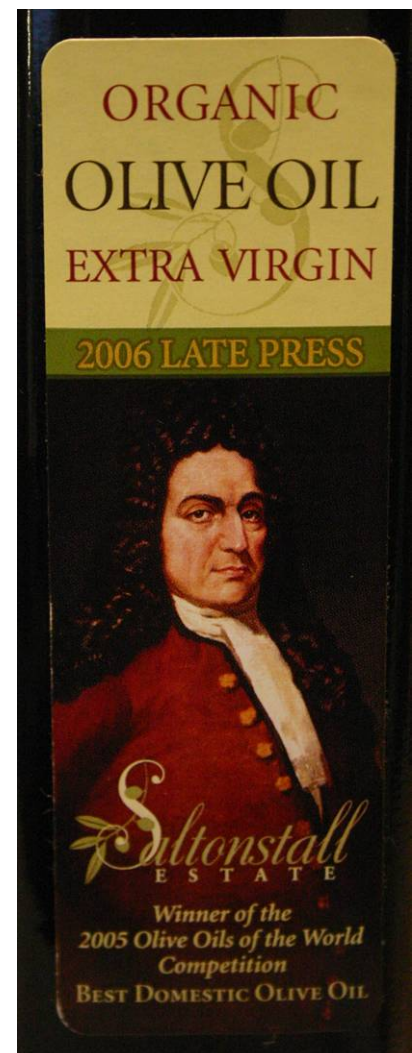
The International Olive Council (IOC) has a United Nations charter to develop quality and purity criteria for olive oil. Their main focus is regulating the legal aspects of the olive oil industry and preventing unfair competition. The standards they have developed are recognized by the vast majority of the world's olive oil producers and marketers. The International Standards under resolution COI/T.15/NC no 3-25 (revised June 2003) lists nine grades of olive oil in two primary categories – (1) Olive Oil and (2) Olive Pomace Oil. These are the official definitions of each of the nine grades:

2.1 OLIVE OIL CATEGORY

Oil obtained solely from the fruit of the olive tree (*Olea europaea* L.) to the exclusion of oils obtained using solvents or re-esterification processes and of any mixture with oils of other kinds (seed or nut oils).

2.1.1 Virgin Olive Oils – obtained solely by mechanical or physical means under thermal conditions that do not lead to alterations in the oil; using only treatments such as washing, decantation, centrifugation, and filtration. Those fit for human consumption are as follows:

- i. **Extra Virgin Olive Oil** - this oil, as evaluated numerically by the mean of a certified taste panel, contains zero (0) defects and greater than zero positive attributes. In other words, more than half of the tasters indicated that it is not defective and has some fruitiness. Extra-virgin oil also must have a free acidity percentage of less than 0.8 and conform to all the standards listed in its category. This is the highest quality rating for an olive oil. Extra virgin olive oil should have clear flavor characteristics that reflect the fruit from which it was made. In relation to the complex matrix of variety, fruit maturity, growing region, and extraction technique, extra virgin olive oils can be very different from one another.
- ii. **Virgin Olive Oil** – this is oil with a sensory analysis rating of the mean of tasters, having defects from 0 to less than 2.5, a free acidity of less than 2%, and conforms to all the other standards in its category. These are oils with analytical and sensory indices that reflect slightly lower quality than extra virgin olive oil.
- iii. **Ordinary Virgin Olive Oil** – oil with a lower organoleptic rating (defects from the mean of tasters 2.5 to less than 6.0), a free acidity of less than 3.3%, and conformity within its category for all other standards. This is inferior oil with notable defects that is not permitted to be bottled under European Union (EU) laws, so it is sent for refining. The EU has eliminated this category and other regulating agencies are likely to follow. It will simply be absorbed into the lampante category.



2.1.1.2 Virgin Olive Oil – Not Fit for Human Consumption (Lampante) - Oil with severe defects (greater than 6.0) or free acidity of greater than 3.3%, and which conforms to the other standards within its category. It is not fit for human consumption and must be refined. These oils come from bad fruit or from improper handling and processing. This grade is designated as not fit for human consumption.

2.1.2 Refined Olive Oil – Not Fit for Human Consumption - Oil obtained from virgin oils by refining methods that do not alter the initial glyceride structure. It has a free acidity of less than 0.3 and must conform to the other standards within its category. Refined olive oil must not come from the solvent extraction of pomace. The refining process usually consists of treating virgin oil/lampante with sodium hydroxide to neutralize the free acidity, washing, drying, odor removal, color removal, and filtration. In the process, the oil can be heated to as high as 430°F (220°C) under a vacuum to remove all of the volatile components. Refined olive oil is usually odorless, tasteless, and colorless. It is designated as not fit for human consumption.

2.1.3 Olive Oil - Oils that are a blend of refined and unrefined virgin oils. It must have a free acidity of not more than 1% and conform to the other standards within its category. This grade of oil actually represents the bulk of the oil sold to the consumer on the world market. Blends are made in proportions to create specific styles and prices. Oils in the US labeled as “Extra Light” would most likely be a blend dominated by refined olive oil. Other blends with more color and flavor would contain more virgin or extra virgin olive oil.

2.2 OLIVE POMACE OIL CATEGORY

Oil obtained by treating olive pomace with solvents. It does not include oils obtained in the re-esterification processes or any mixture with oils of other kinds (seed or nut oils).

2.2.1 Crude Olive-Pomace Oil – Not Fit for Human Consumption - This is the solvent extracted crude oil product as it comes out of the pomace extractor after distillation to separate and recover most of the solvent. EU law also defines any oil containing 300-350 mg/kg of waxes and aliphatic alcohols above 350 mg/kg to be crude pomace oil. It is designated as not fit for human consumption, but is intended for refining.



2.2.2 Refined Olive-Pomace Oil – Not Fit for Human Consumption - Oil obtained from crude pomace oil by refining methods that do not alter the initial glyceride structure. It has a free acidity of not more than 0.3% and its other characteristics must conform to the standard in its category. Refining includes the same methods used for “refined olive oil” except that the source of the raw product comes from pomace by means of solvent extraction. It is designated as not fit for human consumption.

2.2.3 Olive-Pomace Oil - A blend of refined olive-pomace oil and virgin olive oil that is fit for human consumption. It has a free acidity of not more than 1% and must conform to the other standards within its category. In no case shall this blend be called “olive oil.”

Telling Virgin from Refined from Pomace from Seed Oil - What is What?

A combination of over 20 laboratory tests and a sensory tasting is used to determine if an olive oil has been adulterated with seed, pomace, or refined olive oil and to classify and grade olive oils according to IOC standards. The sensory test involves the use of a trained taste panel that is recognized by the IOC. Eight tasters must confirm to a statistical model for accuracy and validity and indicate that if a sample oil is defective or not and if it is, which defect is noted and the intensity of the defect in question. If the sample is not defective, its intensity of fruitiness, bitterness, and pungency is noted. This combination of ratings by the taste panel members will classify an oil as either extra virgin, virgin, or lampante.

Extra Virgin oil: This is the good stuff, with flavor characteristics of fresh, crisp, clean, fruity olive oil. Just like anything else, the taster/consumer must become familiar with this flavor in order to recognize it. Extra virgin oils do not have any off flavors or any flavors of cooked or refined oil. They feel substantial in the mouth and are not greasy. They should have a nice fruity flavor and can have a pleasant bitterness, pungency, and astringency. Olive oils that are slightly defective in flavor that have not been refined or solvent extracted are not extra virgin, but might be graded as virgin olive oil.

Refined oil: Labeled as olive oil or pure olive oil or light olive oil. This is the mediocre stuff that is usually just bland. It is usually not awful unless it has gone rancid, but frequently is not very good either. The sterol content of refined oil is lower due to the neutralization and deodorizing processes. It also has some *trans* isomers due to the heating process. Refined olive oils are popular for frying, because of their high smoke point and low cost.

Pomace oil: The not-very-good-at-all stuff, from solvent extraction of the fermented milling waste. It is usually quite bland in flavor. It goes through the same refining process as refined olive oil. It just had an even worse origin. It usually has a greasy feel in the mouth and possibly a slight cooked taste.

Seed oil: The cheaper alternative oil, can be from many different sources including: corn, soybean, sunflower, safflower, rape-seed (canola), peanut, flax, hazelnut, walnut, almond, grape, palm, cottonseed, wheat bran, rice bran, coconut, or tea seed. The non-seed oil fats of butter, lard and avocado oil are, at least, natural. All the others have been solvent extracted or extensively refined. Even expeller pressed “natural” oils found in the health-food stores, have been refined. Some of these oils have a specific recognizable flavor, but most are bland. Margarine is liquid seed oil that has been hydrogenated (*trans* isomers) to make it solid.

IOC Authenticity and Quality Standards

The IOOC standard oils must meet certain purity criteria for inclusion into specific categories. The olive oils must not be adulterated with any other type of oil, must pass a sensory analysis by a certified panel of tasters, and meet the analytical criteria. The standard indicates all the tests used to determine genuineness and purity plus the legal requirements for the label. Olive oil is defined as oil obtained solely from fruit of the olive tree (*Olea europaea sativa*). Virgin oils further are obtained solely by mechanical means that do not lead to alterations in the oil.



PURITY STANDARDS FOR OLIVE OIL (IOOC-1996) (EU-2002)			
Sterol content and composition	Sterols Cholesterol Brassicasterol Campesterol Stigmasterol D-7 stigmastenol Beta-sitosterol (+)	Olive oil & pomace oil Max 0.5 Max 0.1 Max 4.0 < Campesterol Max 0.5 min 93	(+) <i>Beta-sitosterol</i> + <i>D-5 avenasterol</i> + <i>D-5-23 stigmastadienol</i> + <i>cleroesterol</i> + <i>sitostanol</i> + <i>D-524 stigmastadienol</i>
Total sterols mg/kg	Virgin, Refined & Olive oil Crude pomace oil Refined olive oil Pomace oil	min 1,000 min 2,500 min 1,800 min 1,600	
Fatty acid composition (% mm of methyl esters)	Myristic acid C 14:0 Palmitic acid C 16:0 Palmitoleic acid C 16:1 Heptadecanoic acid C 17:0 Heptadecenoic acid C 17:1 Stearic acid C 18:0 Oleic acid C 18:1 Linoleic acid C 18:2 Linolenic acid C 18:3 Arachidic acid C 20:0 Gadoleic acid C 20:1 Behenic acid C 22:0 Lignoceric C 24:0	Max 0.05 7.5-20.0 0.3-3.5 Max 0.3 Max 0.3 0.5-5.0 55.0-83.0 3.5-21.0 Max 1.0 (EU-0.9) Max 0.6 Max 0.4 Max 0.2 Max 0.2	<i>Max 0.3 for pomace oils</i>
Saturated fatty acids in 2 position (%)	Virgin olive oil Refined olive oil Olive oil Crude pomace oil Refined pomace oil	Max 1.5 (EU-1.3) Max 1.8 (EU-1.5) Max 1.8 (EU-1.5) Max 2.2 (EU-2.0) Max 2.2 (EU-2.0)	
Un-saponifiable material (g/kg)	Olive oil Pomace oil	Max 15 g/kg Max 30 g/kg	
Pomace oil detection	Virgin olive oil Lamp virgin olive oil Refined olive oil Olive oil	Waxes (mg/kg) Max 250 Max 350 (EU-300) Max 350 Max 350	Ervthrodinol + Uvaol Max 4.5 % Max 4.5 % Max 4.5 % Max 4.5 %
Seed oil detection	Maximum difference between real and theoretical ECN 42 content (%)	Virgin olive oil Lamp virgin olive oil Refined olive oil Olive oil Pomace oil	0.2 0.3 0.3 0.3 0.5
Refined vegetable oil detection (ppm)	Virgin olive oil Lamp virgin olive oil Refined olive oil Olive oil Crude pomace oil Refined pomace oil Pomace oil	Stigmastadienes Max 0.15 Max 0.50 Max 50.0 Max 50.0 Max 5.0 Max 120.0 Max 120.0	R₁ - - min 12.0 min 12.0 no limit min 10 min 10
Trans fatty acid content (%)	Virgin olive oil Lamp virgin olive oil Refined olive oil Olive oil Crude pomace oil Refined pomace oil Pomace oil	C:18:1 T < 0.05 Max 0.10 Max 0.20 Max 0.20 Max 0.20 Max 0.40 Max 0.40	C 18:2 T + C 18:3 T < 0.05 Max 0.10 Max 0.30 Max 0.30 Max 0.10 Max 0.35 Max 0.35

- **Sterol composition and content:** Sterols are important components of the non-glycerin fraction of olive oil. Their presence is determined by gas chromatography. Refined olive oils and or pomace oils have higher total sterol levels and specific sterol types must also be within certain maximum levels. (*ISO 12228 & AOCS Ch 6-91*)

- **Fatty acid composition:** is measured by gas chromatography and can help distinguish between varieties and growing region, but also between some seed oils and olive oil. The basic percentages of fatty acid types are well documented for each oil within a certain range. (*ISO 5508 & AOCS Ch 2-91*)

- **Saturated fatty acid content in position 2 of the triglyceride:** The middle carbon of the triglyceride molecule (2 or beta position) in natural virgin olive oil always contains the non-saturated fatty acids such as oleic or linoleic. Reesterified oils that are processed artificially do not conform to this same fatty acid distribution and can be detected with gas chromatography. (*ISO 6800*)
- **Unsaponifiable material:** is the content of components that do not turn to soap under the process of saponification (addition of lye). Limits must be within those specified. (*ISO 3596 & AOCS Ch 3-91*)
- **Wax content:** is used to identify the presence of pomace oil and is determined by gas chromatography. Refining processes can more easily eliminate aliphatic alcohols, but waxes are more difficult to remove. Wax content of oils is higher in pomace oil, because pomace contains a greater proportion of fruit skin where most of the waxes originate. (*AOCS Ch 8-02*)
- **Erythrodiol and uvaol:** are two terpenic alcohols that can be detected with gas chromatography. Some secondary extracted oils, refined pomace oil, and crude pomace oil can exceed the legal limit. Most of these compounds are found in the skin of the fruit. (*IUPAC no. 2.431*)
- **ECN 42 content:** Seed oils can also be detected by the difference of Equivalent Carbon Number (ECN) of the oil molecules determined by High Performance Liquid Chromatography (HPLC) and the theoretical ECN calculated from fatty acid content. Trilinolein is a triglyceride molecule that is not naturally present in olive oil, but appears in seed oils especially in sunflower oil. HPLC is used to detect this molecule that has the configuration of 3 Linoleic fatty acids attached to glycerin (more double bonds); levels cannot exceed the percentages in each category. (*AOCS 5b-89*)
- **Hydrocarbons:** Certain hydrocarbons such as stigmastadienes and the relationship of stigmasta-3, 5 diene, and campesta-3, 5 diene (R_1) can be identified in refined olive oils that have been heated and de-colored. They are not present in virgin olive oil. (*ISO 15788-1 & AOCS Cd 26-96*)
- **Trans fatty acid isomer:** When oils are exposed to high heat or pressure they can change from the “cis” (natural) form to the “trans” form. Detection is with gas chromatography. This method can also detect if oil has been exposed to color removal substances. Trans fat has been shown to raise “bad” LDL cholesterol, lower “good” HDL cholesterol, have adverse effects on the inner lining of blood vessels, and raises the risk of diabetes. Normal cis olive oil has fatty acid molecules that have a curved shape, which allows them to be metabolized properly. Heat and hydrogenation twists the shape (trans) so it does not “fit” correctly with enzymes. New labeling laws in the US will require products to be labeled with the content of *trans* fatty acids in 2006. (*ISO 15304 & AOCS Ce 1f-96*)
- **Total aliphatic alcohols:** are low in virgin olive oil, but much higher in solvent extracted pomace oil, because their levels are higher in fruit skin. Aliphatic alcohol content is measured with gas chromatography. Extra virgin – virgin – ordinary olive oils cannot exceed 250 mg/kg, lampante oil should be < 400, and refined olive oil must be less than 350 mg/kg. (*COI/T.20/Doc. No. 26 – O3*)
- **DNA characterization:** is the recovery of intact or large fragments of DNA from the protein residue in olive oil by using electrophoresis and RAPD analysis to develop a fingerprint. This is the newest technology and a standard for it has not yet been developed.

- **Color:** A subjective visual rating is made of an oil to make sure it does not have unusual color that is not common to olive oil. It can also be evaluated using a spectrophotometer according to the Intl. Union of Pure Applied Chemistry (IUPAC) methods for specific hue, purity, and brightness.
- **Aspect:** A subjective visual rating is made to determine if the oil is clear (limpid) or cloudy after it has been maintained at a temperature of 68°F (20°C) for 24 hours. Aspect can indicate the abnormal presence of saturated fatty acids in olive oil.
- **Free Acidity:** This is a crude indicator of the quality of the fruit and handling procedures prior to milling. It is a measurement of hydrolytic breakdown of the fatty acid chains from triglycerides into diglycerides and monoglycerides, liberating free fatty acids. It is determined easily with a titration of potassium hydroxide that neutralizes the acidity. It is usually expressed as percent (%) free fatty acids on the basis of the oleic acid, because that is the predominant fatty acid in olive oil. It is commonly called the percent acidity or free acidity percent. Free acidity in an oil is not the same as sourness or acidity in other foods. Free fatty acids (acidity) cannot be tasted in olive oil, at least not at the levels normally present.
- **Peroxide Value:** This is a crude indicator of the amount of primary oxidation that has occurred, forming peroxide compounds within the oil. A high value indicates that the olives or paste was likely handled improperly, the oil could be defective, and the oil might not keep well. It is done through a titration that liberates iodine from potassium iodide and is expressed as a value in milliequivalents of free oxygen per kilo of oil (meq O₂/kg).
- **UV Light Absorbency:** This is a more delicate indicator of oxidation, especially in oils that have been heated in the refining process. It measures the quantity of certain oxidized compounds that resonate at wavelengths of 232 and 270 nanometers (nm) in the ultraviolet spectrum in a spectrophotometer. Delta (Δ) K detects oil treatments with color removing substances and the presence of refined or pomace oil by measuring the difference between absorbance at 270 nm and 266 nm – 274 nm.
- **Moisture and Volatiles:** This is a measure of the water and volatile material content that may be present by placing a measured weight of oil in a drying stove for 30 minutes each time and measuring the weight difference until a difference is no longer detected. It is expressed as a percent (%) of the total weight.
- **Insoluble Impurities:** A measure of the presence of dirt, minerals, resins, oxidized fatty acids, alkaline soaps of palmitic and stearic acids, and proteins that are suspended in the oil. It is determined by dissolving some oil in petroleum ether and filtering out the impurities and is expressed as a percentage (%) of the total.
- **Flash Point:** This is a measure of the temperature at which the sample spontaneously begins to burn. Refined olive oil, pomace oil, and seed oils have a lower flash point temperature than virgin olive oil. Virgin olive oils have a flash point around 410°-428°F (210°-220°C), while most seed oils begin to burn at 374°-392°F (190°-200°C). Different than smoke point.
- **Metal Traces:** This is a measure of the amount of Iron and Copper in a sample taken by burning the oil in a special high temperature graphite oven and analyzing the ash with atomic absorption.

OLIVE OIL QUALITY CRITERIA AND STANDARDS 2003 (IOC & EU)

OLIVE OIL QUALITY CRITERIA AND STANDARDS 2003 (IOC & EU)									
	EXTRA VIRGIN	VIRGIN	ORDINARY VIRGIN	LAMP ⁽¹⁾ VIRGIN	REFINED OLIVE	OLIVE OIL	CRUDE POMACE	REFINED POMACE	OLIVE POMACE
Sensory Characteristics									
Median of defects	= 0	0 ≤ 2.5	2.5 < 6.0 ⁽³⁾	> 6.0	Acceptable	Good	---	Acceptable	Good
Median of fruitiness	> 0	> 0	---	---	---	---	---	---	---
Color	---	--	---	---	Yellow	Yellow to green	---	Light to dark yellow	Yellow to green
Aspect	---	---	---	---	Limpid	Limpid	---	Limpid	Limpid
Free Acidity %	≤ 0.8	≤ 2.0	≤ 3.3	≤ 3.3	≤ 0.3	≤ 1.5	No limit	≤ 0.3	≤ 1.5
Peroxide Value meq. O ₂ /kg	≤ 20	≤ 20	≤ 20	No limit	≤ 5	≤ 15	No limit	≤ 5	≤ 15
UV Absorbency ⁽¹⁾									
- 232 nm	≤ 2.5	≤ 2.6	---	---	---	---	---	---	---
- 270 nm	≤ 0.22	≤ 0.25	≤ 0.30 ⁽²⁾	---	≤ 1.10	≤ 0.90	---	≤ 2.00	≤ 1.70
- ^K	≤ 0.01	≤ 0.01	≤ 0.01	---	≤ 0.16	≤ 0.15	---	≤ 0.20	≤ 0.18
H ₂ O and Volatiles %	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.3	≤ 0.1	≤ 0.1	≤ 1.5	≤ 0.1	≤ 0.1
Insoluble Impurities %	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.2	≤ 0.05	≤ 0.05	---	≤ 0.05	≤ 0.05
Flash Point °C	---	---	---	---	---	---	>120°C	---	---
Metal Traces mg/kg									
Iron	≤ 3.0	≤ 3.0	≤ 3.0	≤ 3.0	≤ 3.0	≤ 3.0	---	≤ 3.0	≤ 3.0
Copper	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	≤ 0.1	---	≤ 0.1	≤ 0.1
Halogenated Solvents mg/kg									
Each Solvent	≤ 0.1	≤ 0.1	≤ 0.1	---	≤ 0.1	≤ 0.1	---	≤ 0.1	≤ 0.1
Sum of Solvents	≤ 0.2	≤ 0.2	≤ 0.2	---	≤ 0.2	≤ 0.2	---	≤ 0.2	≤ 0.2
(1) It is not obligatory for the criteria of organoleptic characteristics, acidity, peroxide value, and absorbency to be concurrent; one is sufficient (2) After passage of the sample through activated aluminum, absorbency at 270 nm shall be equal to or less than 0.11 (3) Or when the median defect is lower than or equal to 2.5, and the fruity median is 0									

- **Halogenated Solvents:** This is a measure of the quantity of chloroform, trichloroethylene, and tetrachloroethylene that may be present as residuals in solvent extracted oils. Headspace volatile gases are measured in a gas chromatograph and expressed in mg/kg.
- **Additives:** For virgin olive oils none are permitted. For refined olive oil, olive oil, refined pomace oil and pomace oil a maximum of 200 mg/kg of alpha-tocopherol is permitted.
- **Heavy Metals & Pesticide Residues:** All oils must comply with Codex Alimentarius maximum limits.

ISO – International Organization for Standardization. <http://www.iso.com>

AOCS – American Oil Chemists Society <http://www.aocs.org>

IUPAC – International Union of Pure and Applied Chemistry <http://www.iupac.org>

Sensory Characteristics

One of the most important aspects of olive oil classification and value determination is sensory analysis. Human sensory evaluation is much more accurate (100 times) for olive oil than laboratory equipment for certain characteristics. Aroma and taste are very complex and cannot be determined in the laboratory. The tongue can also detect texture differences difficult to measure analytically. The first and primary objective in sensory evaluation for olive oil is to determine if oils contain one or more of the defects that commonly occur in oils from improper fruit storage, handling, pest infestation, oil storage, or processing

problems. Olive oil should have a fruity olive flavor that is characteristic of the variety or blend of varieties making up the oil. There should be no vinegary or fermented odor or flavor. The oil should also not be rancid or possess any other off flavor that is essentially not of the olive. The second objective of oil-sensory evaluation is to describe the positive characteristics of the oil in relation to its intensity of olive-fruity character. Bitterness and pungency are often present in olive oils, especially when newly made. They are not defects and will mellow as the oils age.



A secluded taste panel member evaluating oils in silence

The numerical sensory values for each of the first three grades (extra virgin, virgin, and ordinary virgin) come from a rating of the oil by a qualified taste panel that has been officially recognized by the IOC. The majority of the tasters, usually 5 of 8, must agree statistically on the rating of the oil indicating the same defect, if any is present, and similar intensity for fruitiness, bitterness, and pungency.

Guidelines for Tasting Olive Oil

- Taste oil in mid morning
- Don't eat anything or have any foreign flavors in your mouth before tasting (no smoking, toothpaste, gum, candy, lipstick, coffee, etc.)
- Don't have foreign smells on your hands or body such as perfumes or after shave
- Find a room that is quiet and free of any odor
- Sit down, relax, take your time (5-15 minutes per oil)
- Taste about 4-5 oils and no more than 10 oils at any one time
- Cleanse your palate with sour apple (Granny Smith variety) and water between oils
- Use some sort of recording sheet that identifies date, oil sample, name, and attributes
- If possible remove the bias of color from your tasting by using a colored glass
- Swirl the glass with a cover on it or use your hand to cover the glass
- Warm the oil up to about body temperature before smelling or tasting it. It should not be cold or hot as you put it into your mouth
- Remove the cover or your hand and immediately smell the oil by taking a big whiff
- Drink about 3-5 ml of the oil, but before swallowing it suck in air and swirl it around your entire mouth for about 10 seconds. Swallow it, close your mouth and breathe out through your nose
- Immediately write down your impressions - first ones are usually the best

Positive Attributes (Defined by the IOC)

- **Fruity** - Set of the olfactory sensations characteristic of the oil, which depends on the variety and comes from sound, fresh olives, either ripe or unripe. It is perceived directly or through the back of the nose (retro-nasal).
- **Bitter** - Characteristic taste of oil obtained from unripe olives. Perceived on the back of the tongue.

• **Pungent** - "Picante" or biting tactile sensation characteristic of certain olive varieties or oil produced from unripe olives. Perceived in the throat.

Negative Attributes (Defined by the IOC)

• **Fusty** - Characteristic flavor of oil obtained from olives stored in piles, which have undergone an advanced stage of anaerobic fermentation. *Associated with n-octane, produced from the decomposition of 10-hydroperoxide of oleic acid and isoamyl alcohol formed from fermentation.*

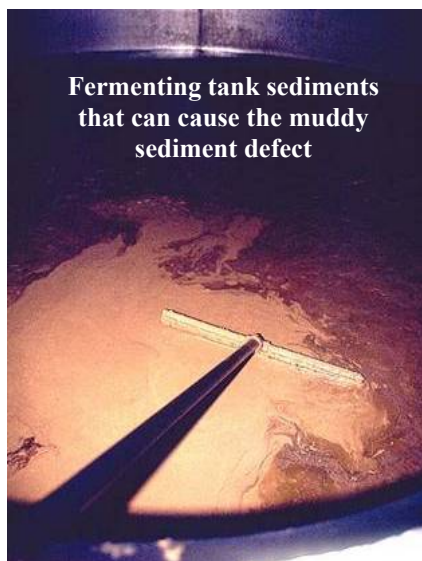
• **Musty** - Characteristic moldy flavor of oils obtained from fruit in which large numbers of fungi have developed as a result of its being stored in humid conditions for several days.

• **Muddy sediment** - Characteristic flavor of oil that has been left in contact with the sediment in tanks and vats.



• **Winey-Vinegary** - Characteristic flavor of certain oils reminiscent of wine or vinegar. This flavor is mainly due to aerobic fermentation in the olives leading to the formation of acetic acid, ethyl acetate, and ethanol.

• **Rancid** - Flavor of oils, which have undergone a process of oxidation and a fragmentation of hydroperoxides into compounds with characteristic disagreeable odors such as: aldehydes, ketones, acids, alcohols, lactones, furans, and esters.



• **Heated or Burnt** - Characteristic flavor of oils caused by excessive and/or prolonged heating during processing.

Press mats can easily ferment and cause the fusty and or winey-vinegary defects



California Olive Oil Standards

In 1997, the California legislature enacted a law for labeling olive oil that specifies truth in labeling as to location of production, processing, and bottling. State Senate Bill 920 (California Health and Safety Code: 112875-112935) makes it a crime to sell imitation olive oil or to sell olive oil labeled as "California" olive oil that contains oil from any other source. It also specifies that oils labeled according to designated American-approved "viticultural areas" be composed of 75% of oil which is derived solely from olives grown in that designated American viticultural area.

112875. "Olive oil," as used in this chapter, means the edible oil obtained from the fruit of the olive tree (*Olea europaea* L.).

112880. "Imitation olive oil," as used in this chapter, means the mixture of any edible oil artificially colored or flavored to resemble olive oil.

112885. Unless a license so to do is first obtained from the department, it is unlawful for any person in this state to engage in the packaging or manufacture of olive oil, or in the wholesale distribution of olive oil where his or her name and address will appear upon olive oil containers of one pint capacity or larger, as the distributor and his or her name will appear upon the containers as the only California addressee.

112890. On receipt of an application showing that the applicant is properly equipped to package or manufacture olive oil, or is a wholesale distributor of olive oil whose name and address will appear upon olive oil containers as distributor and whose name also will appear upon those containers as the only California addressee, the department shall, free of charge, issue the applicant a license, not transferable, but good until revoked, to package, manufacture, or distribute olive oil as the case may be.

The department may revoke or suspend the license after a hearing. The proceedings for the revocation or suspension of a license shall be in accordance with Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code, and the department shall have all the powers granted in that chapter.

112895. (a) It is unlawful to manufacture, sell, offer for sale, give away, or to possess imitation olive oil in California.

(b) This section does not prohibit the blending of olive oil with other edible oils, if the blend is not labeled as olive oil or imitation olive oil, is clearly labeled as a blended vegetable oil, and if the contents and proportions of the blend are prominently displayed on the container's label.

(c) Any olive oil produced, processed, sold, offered for sale, given away, or possessed in California, that indicates on its label "California Olive Oil," or uses words of similar import that indicate that California is the source of the oil, shall be made of oil derived solely from olives grown in California.

(d) Any olive oil produced, processed, sold, offered for sale, given away, or possessed in California, that indicates on its label that it is from an area that is one of the approved American Viticultural Areas as set forth in Part 9 (commencing with Sec. 9.1) of Title 27 of the Code of Federal Regulations shall be made of oil 75 percent of which is derived solely from olives grown in that approved American Viticultural Area.

112900. The use of any artificial color or flavor in the manufacture or blending of olive oil is prohibited.

112905. It is unlawful to prepare, express, mix, or blend olive pomace or meats with any bland fixed oil other than olive oil.

112910. All records of those licensed under the provisions of this chapter that concern the amounts of olive oil produced, purchased, or produced and purchased, or the sale, distribution, or sale and distribution of any olive oil, shall be open to inspection upon demand of any agent of the department.

112915. It is unlawful to reuse any olive oil container, can, or drum for repacking any fixed oil intended to be used for food purposes, except on the premises of the processor.

112920. All olive oil for technical purposes shall be denatured with an odoriferous substance so as to render it unfit for food purposes.

112925. It is unlawful to sell or offer for sale olive oil containing more than 5 percent free fatty acid without first denaturing the oil and making it unfit for human consumption.

112930. The department shall enforce this chapter.

112935. Any person violating any of the provisions of this chapter is guilty of a misdemeanor, and upon conviction shall be punished by a fine of not less than five hundred dollars (\$500) nor more than one thousand dollars (\$1,000), or by imprisonment in the county jail for not exceeding one year, or by both fine and imprisonment.

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