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# Crown Iron Works Company

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## GLOSSARY FOR OILS AND FATS REFINING

<b>Acid Conditioning</b>	Precipitation of hydratable and non-hydratable phosphatides and trace metals by mixing and reacting crude oil with acid. Caustic may also be added to neutralize the acid and create a small amount of soap, which enhances the performance of silica when used in the bleaching process.
<b>Acid Degumming</b>	Removal of gums (precipitated by some form of acid conditioning) by centrifugal separation.
<b>Acid Refining</b>	See Special Degumming.
<b>Acidulation</b>	See Soapstock Splitting.
<b>Alkali Refining</b>	See Chemical Refining.
<b>Anisidine Value (AV)</b>	A measurement of a triglyceride's secondary oxidation determined by the amount of aldehydes formed as peroxides decompose.
<b>Antioxidant</b>	A substance that slows or interferes with the reaction of a fat or oil with oxygen. The addition of antioxidants to fats or foods containing them retards rancidity and increases stability and shelf life.
<b>Beta-Carotene</b>	A carotenoid that is a desirable antioxidant.
<b>Bleaching</b>	Removal of color and oxidizing bodies, residual gums, soap and trace metals by mixing oil with special adsorbents (silica and/or bleaching earth). The adsorbents containing the above mentioned impurities are then removed by filtration.
<b>Brush Hydrogenation</b>	See Hydrogenation. Associated with small increases in saturation to improve stability (shelf life) of an oil.
<b>Carotenoids</b>	Naturally occurring yellow to deep red coloring in fats and oils removed in deodorization.
<b>Catalyst</b>	A material which accelerates a chemical reaction without becoming part of the reaction products.
<b>Catalyst Scavenging</b>	Part of hydrogenation process. Similar to acid conditioning (followed by filtration) but applied after catalyst removal.
<b>Caustic Refining</b>	See Chemical Refining
<b>Chemical Refining</b>	Refining based on neutralizing, bleaching and deodorizing, where the bulk of the fatty acids are removed after being saponified by caustic in the neutralizing step. Note that water degumming (before neutralizing) is required for lecithin production.



<b>Chlorophyll</b>	A natural, green coloring agent vital to a plant's photosynthesis process which is removed from the oil through the neutralizing and bleaching processes.
<b>Cholesterol</b>	A fat-soluble sterol found primarily in animal cells important in physiological processes.
<b>Cis</b>	A geometric isomer of an unsaturated fatty acid where the hydrogen atoms attached to the carbon atoms comprising the double bond are on the same side of the carbon chain.
<b>Cold Degumming/ Neutralizing/Washing</b>	Degumming, neutralizing or water washing practiced at low temperatures before separation so that most of the waxes in the oil are crystallized and removed by the gums, soapstock or wash water.
<b>Cold Deodorizing</b>	Reduction of odor by treating oil with special type of reagent/adsorbent. Practiced as a rare alternative to normal distillation based process for extremely heat sensitive specialty oils or to prolong life of frying oils.
<b>Confectionery Fat</b>	A broad range of fats used in the formulation of sweet goods such as candy bars, bakery product coatings, cream centers, and granola bars.
<b>Conjugated Fatty Acids</b>	Polyunsaturated fatty acids with pairs of unsaturated carbons not separated by at least one saturated carbon.
<b>Crude Oil</b>	The oil or fat obtained from the initial extraction of a vegetable or an animal source.
<b>Deaerating</b>	Removal of dissolved and entrained air from bleached oils by subjecting the heated oil to vacuum. Usually an integral part of the deodorizing process.
<b>Degumming</b>	Generic expression for removal of phosphatides and other mucilaginous matter from the oil.
<b>Deodorizing</b>	Removal of fatty acids, odor, flavor and destabilizing impurities, as well as some color bodies by subjecting the oil to high vacuum and temperature, augmented by direct steam agitation, under conditions so that the impurities are vaporized and removed while the oil remains liquid.
<b>Dewaxing</b>	Removal of small amounts of high temperature melting components (waxes) that cloud the oil at storage temperature. The term is typically associated with processing of sunflower and rice bran oils. The oil is chilled then mixed with filter aid. After holding the oil for a certain period, the waxes become solid (crystallize) and can be removed by filtration. In some cases centrifugal separation is used in combination with degumming, neutralizing or water washing instead of filtration,
<b>Diglyceride</b>	The ester resulting from the chemical combination of glycerol and two fatty acids.
<b>Double Bond</b>	Two adjacent carbon atoms with dual linkage (bond) between the carbons.
<b>Double Pass Bleaching</b>	Two stage bleaching process, also referred to as "lead-lag", where the incoming oil is first pre-bleached in a filter loaded with once used earth. Method reduces earth consumption by as much as 30%. When combined with silica adsorption, the consumption may be reduced by up to 50%.
<b>Dry Degumming</b>	Removal of gums (precipitated by acid conditioning) by filtration during the bleaching process. Used to express difference from removal by centrifugal separation.



<b>Drying</b>	Removal of moisture (water) from degummed or neutralized and washed oils before storage or bleaching filtration, by spraying the heated oil into a vacuum vessel and evaporating the water.
<b>Dry Physical Refining</b>	Physical Refining based on Dry Degumming.
<b>Enhanced Degumming</b>	Any form of degumming where special reagents, in addition to plain water, are used to improve removal of gums.
<b>Enzymatic Degumming</b>	Special Degumming enhanced by using enzymes.
<b>Esterification</b>	Chemical combination an alcohol and an acid to form an ester.
<b>Fat</b>	Esters of fatty acids and glycerol which are normally solid at room temperature.
<b>Fatty Acid</b>	The fundamental unit within a triglyceride fat molecule, composed of a chain of carbon and hydrogen atoms ending with a reactive group consisting of carbon, hydrogen, and oxygen.
<b>Flash Point</b>	The temperature at which an oil sample, when heated under prescribed conditions, will flash when a flame is passed over the surface of the oil.
<b>Fractionation</b>	Removal of higher melting fractions (stearine) that solidify at higher than desired temperatures. This is done by cooling the oil or fat so that the stearine forms crystals that can be separated, usually by filtration. The term is mainly associated with processing of palm and similar highly saturated oils.
<b>Free Fatty Acids (FFA)</b>	A fatty acid that is split from a triglyceride typically by hydrolysis. Fatty acids are impurities in a refined oil that are removed in the neutralizing and deodorizing process.
<b>Fully Hydrogenated</b>	An oil or fat that has been hydrogenated to the extent that the resultant product has practically no double bonds or trans isomers and is solid at room temperature.
<b>Gums</b>	See Phosphatide.
<b>Hard Butter</b>	A generic term used primarily in the confectionary industry to describe a class of fats with physical characteristics similar to those of cocoa butter or dairy butter.
<b>Heat Bleaching</b>	Heat induced thermal breakdown, evaporation and/or decolorization of mainly carotenoid color bodies. Usually an integral part of the deodorizing process.
<b>Hydration</b>	Precipitation and agglomeration of phosphatides by mixing and reacting acid conditioned or crude oil with water.
<b>Hydrogenation</b>	Increase of an oil's stability (resistance to oxidation) and melting point through selective saturation of double bonds (creating more saturated fatty acids). This is done by reacting a bleached and dried oil with hydrogen in the presence of a catalyst (e.g. nickel), followed by removal of the catalyst by filtration or centrifugal separation.



<b>Hydrolysis</b>	The chemical reaction of a triglyceride with water forming glycerine and free fatty acids.
<b>Interesterification</b>	Modification of an oil or fat's melting characteristics by altering distribution of the fatty acids over the triacylglycerols. This is done by reacting a neutralized and dried oil with a catalyst (e.g. sodium methylate), after which the resulting catalyst soap is removed by silica adsorption. Alternatively the process can be implemented with the use of enzymes.
<b>Iodine Value (IV)</b>	An expression of the degree of unsaturation of a fat. It is determined by measuring the amount of iodine which reacts with a natural or processed fat under prescribed conditions.
<b>Isomer</b>	Compounds containing the same elements in the same proportions which can exist in more than one structural form; e.g., geometric, positional, or cyclic.
<b>Lauric Oils</b>	Oils containing 40-50% lauric acids (C <sub>12</sub> ) in combination with other relatively low molecular weight fatty acids. Coconut and palm kernel oils are principal examples.
<b>Lecithin</b>	A mixture of naturally occurring phosphatides which has emulsifying, wetting and antioxidant properties, a principal source of which is crude soybean oil.
<b>Lecithin Drying</b>	Removal of moisture from wet gums recovered from Water Degumming (mainly soybean oil), by heating gums in a scraped surface evaporator under vacuum.
<b>Lipid</b>	A broad spectrum of fat and fat-like compounds including mono-, di-, and triglycerides, sterols, phosphatides and fatty acids.
<b>Lipoprotein</b>	Any of the class of proteins that contain a lipid combined with a simple protein.
<b>Long-Mix Neutralizing</b>	Neutralization based on mixing oil with caustic at a relatively low temperature and reacting for an extended time (minutes) before further heating and separation.
<b>Medium-Chain Triglyceride (MCT)</b>	Triglycerides containing fatty acid chains of 6-10 carbon atoms which are readily absorbed by the body.
<b>Membrane Degumming</b>	Degumming process using ultrafiltration done while oil is in miscella phase (dissolved in solvent).
<b>Miscella Refining</b>	Neutralizing process while oil is still dissolved in solvent (hexane) after solvent extraction. Typically practiced for cottonseed oil
<b>Modified Caustic Refining (MCR)</b>	A chemical refining process replacing the water washing step in neutralizing with silica adsorption in bleaching. The process and term invented by W.R. Grace, USA.
<b>Modified Physical Refining</b>	Dry Physical refining process enhanced by Silica Adsorption. The process and term invented by W.R. Grace, USA.
<b>Monoglyceride</b>	The ester resulting from the combination of glycerol and one fatty acid.



<b>Monounsaturated</b>	A fatty acid containing only one pair of carbon-carbon double bonds.
<b>Neutralizing</b>	Removal of free fatty acids (FFA), hydratable and non-hydratable phosphatides, trace metals and color bodies (precipitated by mixing and reacting with caustic) by centrifugal separation. The process is most often preceded by acid conditioning.
<b>Nonconjugated Fatty Acids</b>	Polyunsaturated fatty acids with pairs of carbons separated by at least one saturated carbon atom.
<b>Oil</b>	Esters of fatty acids and glycerol which normally are liquid at room temperature.
<b>Olean (Olestra)</b>	A sucrose fatty acid polyester used as a substitute for dietary fat which is not digested or absorbed by the body.
<b>Oleic Acid</b>	An 18-carbon fatty acid with one carbon-carbon double bond; liquid at room temperature.
<b>Olein</b>	The liquid fraction of oil remaining after removing solid fraction from a cooled oil or fat.
<b>Once Refined</b>	A neutralized and water washed oil or fat.
<b>Organic Refining (Non-chemical)</b>	Physical Refining without "chemicals" based on citric acid conditioning or degumming, bleaching with non-acid activated earths and deodorizing.
<b>Organic Refining Process (ORP)</b>	Acid Degumming enhanced by using large amounts of citric acid solution. As a result, residual amount of phosphatides in oil is very low, making process suitable for Physical Refining. Other main benefit is that heavy phase from separator can be decanted into free oil, gums and acid solution. The oil is recovered, the acid solution recycled and the gums sent to further processing. Process was developed by AG Processing and patented by IPH, USA.
<b>Oxidation</b>	The reaction of oxygen with an oil or fat causing rancidity.
<b>Packed Bed Bleaching</b>	Refers to pre-loading all or some of the bleaching earth on a filter and passing the oil through the (packed) bed instead of continuously mixing all of the earth with the oil then filtering. Bleaching of oil that occurs as it passes through the filter cake is known as "press effect".
<b>Partially Hydrogenated</b>	An oil which has been lightly to moderately hydrogenated to shift the melting point to a higher temperature range, increase the stability of the oil, and/or modify the fat's melting characteristics
<b>Peroxides</b>	The intermediate compounds formed during the oxidation of lipids which may react further to form the compounds that cause rancidity.
<b>Peroxide Value (PV):</b>	A measurement of a triglycerides primary oxidation determined by the amount of hydroperoxides.
<b>Phosphatide</b>	The chemical combination of an alcohol (typically glycerol) with phosphoric acid and a nitrogen compound; synonymous with phospholipids. Commonly referred to as gums.



<b>Physical Refining</b>	Refining based on dry or wet degumming, bleaching and deodorizing, where the bulk of the fatty acids are removed by evaporation (stripping) in the deodorizing step. The word physical refers to the removal of fatty acids by physical means (steam) rather than chemical (reaction with caustic).
<b>Polymerize</b>	The bonding of similar molecules into long chains or branched structures.
<b>Polyunsaturated</b>	A fatty acid containing more than one pair of carbon-carbon double bonds.
<b>Post Bleaching</b>	Part of hydrogenation process. Similar to bleaching but applied after catalyst removal in cases when the color of the oil has darkened as a result of the hydrogenation process. Often preceded by acid treatment to remove residual catalyst (scavenging).
<b>Pretreatment</b>	See Acid Conditioning.
<b>Refining</b>	This word generally refers to the basic processes required to fully turn a crude oil into a relatively odorless, tasteless and light colored oil with an acceptable shelf life. The basic processes are degumming and/or neutralizing followed by bleaching and deodorizing. A refined oil should therefore mean a fully processed oil. Often, however, the word is used to describe an oil that has only been neutralized. For this reason it is common to hear fully processed oil expressed as "RBD" oil, i.e. refined, bleached, deodorized.
<b>RBD</b>	Refined, Bleached, and Deodorized.
<b>Saponification</b>	The chemical reaction between a fatty acid and an alkaline compound creating soap.
<b>Saturated</b>	A fatty acid containing no carbon-carbon double bonds.
<b>Short-Mix Neutralizing</b>	Neutralization based on intensively mixing the oil with the caustic at a relatively high temperature and reacting for very short time (seconds) before separation.
<b>Silica Adsorption</b>	Removal of residual gums, soap and trace metals (salts) from acid conditioned or degummed or neutralized oil by mixing the oil with silica, which adsorbs the impurities, followed by filter separation of the spent silica.
<b>Soapstock</b>	The by-product from the neutralizing step of chemical refining consisting of soap, hydrated gums, water, oil and other impurities.
<b>Soapstock Splitting</b>	Recovery of fatty acids from soapstock by reacting and splitting the material with sulfuric acid. Produces "acid oil" and a water effluent with over 20,000 BOD.
<b>Soft Degumming</b>	Water degumming enhanced by a complexing agent (EDTA), invented by E. Deffense and patented by Tirtiaux, Belgium.
<b>Solid Fat Content (SFC)</b>	A measurement of a fat's melting characteristic using pulsed nuclear magnetic resonance (NMR).
<b>Solid Fat Index (SFI)</b>	A measurement of a fat's melting characteristic using a dilatometric procedure.



<b>Special Degumming</b>	Acid Degumming enhanced by caustic addition after adding acid. Term invented by Alfa-Laval, Sweden.
<b>Steam Refining</b>	See Physical Refining.
<b>Stearic Acid</b>	A saturated 18-carbon fatty acid; solid at room temperature.
<b>Stearine</b>	The solid fat product created by fractionation.
<b>Sterol</b>	A compound made up of the sterol nucleus, an 8-10-carbon side chain, and an alcohol group.
<b>Stripping</b>	Bulk removal of fatty acids as part of the deodorizing process.
<b>Super Degumming</b>	Acid degumming enhanced by temperature reduction and extended retention time, invented by J. Segers and patented by Unilever, The Netherlands.
<b>Tocopherol</b>	A naturally occurring antioxidant found in many vegetable oils.
<b>Total (TOP) Degumming</b>	Special degumming enhanced by double separation stages, invented by A. Dijkstra and patented by Vandemoortele, Belgium, now owned by Westfalia Separator, Germany.
<b>Trans</b>	A geometric isomer of an unsaturated fatty acid where hydrogens attached to the carbons comprising the double bond are on opposite sides of the carbon chain.
<b>Triglyceride</b>	The chemical combination of glycerol and three fatty acids.
<b>Uni-Degumming</b>	Super Degumming process enhanced by addition of caustic, invented by J. Segers and patented by Unilever, The Netherlands, now licensed by Westfalia Separator, Germany.
<b>Unsaturated</b>	A fatty acid containing at least one carbon-carbon double bond.
<b>Water Degumming</b>	Removal of gums (precipitated by pure water hydration of crude oil) by centrifugal separation. Used when extracting gums for production of lecithin.
<b>Water Washing</b>	Part of neutralizing process. Reduction of residual soap (and gums) in caustic treated (neutralized) and centrifuged oil by mixing the hot oil with water, thereby dissolving the soap into the water phase (as well as precipitating more gums) and then removing the fatty water by a second centrifugal separation. This method creates large amounts (5 - 15% of oil flow) of waste water and is not necessary in systems that use silica in the bleaching process.
<b>Wax</b>	The chemical combination of a long-chain alcohol and fatty acids.
<b>Wet Degumming</b>	Any degumming process which removes gums by centrifugal separation. Term used to express difference from removal by filtration (Dry Degumming).
<b>Wet Physical Refining</b>	Physical Refining based on Wet Degumming.
<b>Winterizing</b>	Alternative term for dewaxing and fractionation. The term originated with the old practice of storing cottonseed oil in tanks over the winter so that the high melting fraction could be removed after settling to the bottom of the tank.