

1-ntroduction

1-1-Oils:

Oils are fats that are liquid at room temperature, like the vegetable oils used in cooking. Oils come from many different plants and from fish. Oils are NOT a food group, but they provide essential nutrients. ..

Some commonly eaten oils include:

- canola oil
- corn oil
- cottonseed oil
- olive oil
- safflower oil
- soybean oil
- sunflower oil

Some oils are used mainly as flavorings, such as walnut oil and sesame oil. A number of foods are naturally high in oils, like:

- nuts
- olives
- some fish
- avocados

Most oils are high in monounsaturated or polyunsaturated fats, and low in saturated fats. Oils from plant sources (vegetable and nut oils) do not contain any cholesterol. In fact, no plant foods contain cholesterol.

A few plant oils, however, including coconut oil, palm oil, and palm kernel oil, are high in saturated fats and for nutritional purposes should be considered to be solid fats.

Solid fats are fats that are solid at room temperature, like butter and shortening. Solid fats come from many animal foods and can be made from vegetable oils through a process called hydrogenation.[Arctander's,1994]

1-1-1-Essential oils:

Essential oils are natural aromatic compounds found in the seeds, bark, stems, roots, flowers, and other parts of plants. They can be both beautifully and powerfully the smell of fresh cut mint, you have experi

enced the aromatic qualities of essential oils. In addition to giving plants their distinctive smells, essential oils provide plants with protection against predators and disease and play a role in plant pollination.

Essential oils are non water-based phytochemicals made up of volatile aromatic compounds. Although they are fat soluble, they do not include fatty lipids or acids found in vegetable and animal oils. Essential oils are very clean, almost crisp, to the touch and are immediately absorbed by the skin. Pure, unadulterated essential oils are translucent and range in color from crystal clear to deep blue

1-1-2-VOLatile oils:

Volatile oils are also known as essential oils, ethereal oils, or aromatherapy oils. These products are most commonly used for aromatherapy or perfumery. Made completely from plant products, volatile oils are composed of chemical compounds that make up specific aromas. These aromas are generally created by pressing and steaming plants and flowers. They may also be manufactured via cold-pressing or solvent extraction.

Volatile oils have numerous uses. Many such oils may be applied topically in small doses, preferably with the aid of another product. Massage therapists or other salon employees may utilize the fragrance from volatile oils to calm and relax clients. When used in these cases, the perfume oil is often added to a more gelatinous type of oil, namely massage oil. Volatile oils alone are much too concentrated to be applied all over the skin.[guba, 2002]

1-1-3-Physical properties:

1.1.3.1-Refractive index:

The refractive index of a transparent medium is defined as the relationship of the vacuum velocity of light and the velocity of light within said medium. The name derives from the presence of this value in Snell's Law.

1.1.3.2- Density:

Is defined as the mass per unit volume of substance . it is most often reported for oils in units of g/ml and less often in unit of g/m Density is temperature-dependent

1.1.3.3-Viscosity:

Viscosity is a measure of a fluid's resistance to flow; the lower the viscosity of a fluid, the more easily it flows like density ,viscosity is affected by temperature . as temperature decreases ,viscosity increases .

Viscosity is a very important property of oils because it affects the rate at which spilled oil will spread, degree to which it will penetrate shoreline substrates, and the selection of mechanical spill countermeasures equipment .

1.1.3.4-Water Content:

Some of the oil samples received by ESD contain substantial amounts of water. Because any process that would spate the oil and water would also change the composition of the oil .most properties were determined on the oils as received.

1.1.4-Chemical propertiss:

1.1.4.1-Saponification value:

Is measure of the free acid and saponifiable ester groups . it is expressed as the number of milligrams of potassium hydroxide required to neutralize the free acids and saponify the esters contained in one gram of the material .

1.1.4.2-Acd values:

Is the milligrams of potassium hydroxide that needed to neutralize the amount of free acid present in one gram of fat or oils .

1.1.4.3-Peroxide value:

Is the number of equivalents of peroxide per one kilogram of oil or fat .detection of peroxide gives the initial evidenc of rancidity in unsaturated fats and oils , it is best test for autoxidtion peroxide is intermediates in the autoxidation reaction .

1.1.4.4-Iodine value:

Is the mass of iodine in grams that is consumed by 100 grams of chemical substance .iodine numbers are used to determine the amount of unsaturation in fatty acids this un saturation is in the form of double bonds .the higher the iodine number the more double bonds are present in the fat.

1.2-Sohxolet extractor:

A sohxolet extractor is apiece of laboratory apparatus , it was originally designed for the extraction of a lipid from a solid material .

Typically ,a soxhlet extraction is only required where the desired compound has a limited solubility in a solvent ,and the impurity is insoluble in that solvent .if the desired compound has a significant solubility in a solvent then a simple filtrate can be used to separate the compound from the insoluble substance .normally a solid material containing some of the desired compound is placed inside a thimble made from thick filter paper ,which is loaded into the main chamber of the soxhlet extractor .the soxhlet extractor is placed onto a flask containing the extraction solvent .The soxhlet is then equipped with a condenser .the solvent is heated to reflex .The solvent vapour travels up a distillation chamber housing the thimble of solid .The condenser ensures that any solvent vapour cools ,and drips back down into the chamber housing the solid material .The chamber containing the solid material slowly fills with warm solvent .some of the desired compound will then dissolve in the warm solvent .When the soxhlet chamber is almost full, the chamber is

automatically emptied by a siphon side arm, with the solvent running back down to the distillation flask. The thimble ensures that the rapid motion of the solvent does not transport any solid material to the still pot. This cycle may be allowed to repeat many times, over hours or days.

1.3-Castor oil

Castor oil is a vegetable oil obtained by pressing the seeds of the Castor plant (*Ricinus communis*). The common name "castor oil", from which the plant gets its name, probably comes from its use as a replacement for castoreum, a perfume base made from the dried perineal glands of the beaver (*castor* in Latin). [FTTY OILS IN ULLMANN'S ENCYCLOPEDIA OF CHEMISTRY]

Castor oil is of water –white to pale-straw color. Its boiling point is 313 °C (595 °F). Castor oil differs in appearance and quality according to the method of preparation. Thus medicinal oil, obtained by pressing at a temperature not exceeding about 90 to 100 °F, the press cake from cold pressing is broken up and pressed again at a higher temperature, when a rather darker oil results. If medicinal oil is not required, the pressing is usually carried out at higher temperature when as little as 10 percent of oil may be left in the cake. Commercial crude oil pressed at the lower temperature is known as firsts. Usually an extraction by solvent is made on the pressed cake to recover as much oil as possible as the cake cannot be used for cattle feeding and the presence of oil is not advantageous in manure. (oils, fats and fatty foods.....)

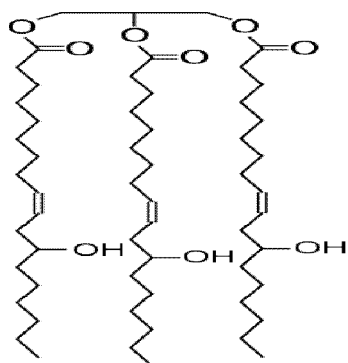
1.3.1-Composition:

Castor oil is famous as a source of ricinoleic acid, a monounsaturated, 18-carbon fatty acid. Among fatty acids, ricinoleic acid is unusual in that it has a hydroxyl functional group on the 12th carbon. This functional group causes ricinoleic acid (and castor oil) to be more polar than most fats. The chemical reactivity of the alcohol group also allows chemical derivatization that is not possible with most other seed oils. Because of its ricinoleic acid content, castor oil is a valuable chemical in feedstocks, commanding a higher price than other seed oils.

Average composition of castor seed oil / fatty acid chains			
Acid name	Average percentage		
Ricinoleic acid	95	To	85%
Oleic acid	6	To	2%
Linoleic acid	5	To	1%
Linolenic acid	1	To	0.5%
Stearic acid	1	To	0.5%
Palmitic acid	1	To	0.5%
	0.5	To	0.3%
Dihydroxystearic ac			
Others	0.5	To	0.2%

[july 2007 commodity price for Indian castor oil. Retrieved 2008-08-10.]

1.3.2-Structure of the major component of castor oil:



[Seed oil prices from US Dept. of Agriculture, see page 31 (PDF). Retrieved 2008-08-10].

1.3.3 Uses:

-Food and preservative:

In the food industry, castor oil (food grade) is used in food additives flavorings, candy (e.g., Polyglycerol polyricinoleate or PGPR in chocolate), as a mold inhibitor, and in packaging. Polyoxyethylated castor oil is also used in the food industries. [Wilsonr,19998]

-Medicine:

The United States Food and Drug Administration (FDA) has categorized castor oil as "generally recognized as safe and effective" (GRASE) for over-the-counter use as a laxative with its major site of action the small intestine where it is digested into Ricinoleic acid.

Therapeutically, modern drugs are rarely given in a pure chemical state, so most active ingredients are combined with excipients or additives. Castor oil, or a castor oil derivative such as Kolliphor EL (polyethoxylated castor oil, a nonionic surfactant), is added to many modern drugs, including:

- Miconazole, an antifungal agent;
- Paclitaxel, a mitotic inhibitor used in cancer chemotherapy;
- Sandimmune (cyclosporine injection, USP), an immunosuppressant drug widely used in connection with organ transplant to reduce the activity of the patient's immune system
- Nelfinavir mesylate, an HIV protease inhibitor
- Saperconazole, a triazole antifungal agent (contains Emulphor EL-719P, a castor oil derivative);
- Tacrolimus, an immunosuppressive drug (contains HCO-60, polyoxyl 60 hydrogenated castor oil);¹ Xenaderm ointment, a topical treatment for skin ulcers, is a combination of Balsam of Peru, castor oil, and trypsin
- Aci-Jel (composed of ricinoleic acid from castor oil, with acetic acid and oxyquinoline) is used to maintain the acidity of the vagina. [Marmion,1976]

-Alternative medicinal use

In naturopathy castor oil has been promoted as a treatment for a variety of human health conditions. The claim has been made that applying it to the skin can help cure cancer. However, according to the American Cancer Society, "available scientific evidence does not support claims that castor oil on the skin cures cancer or any other disease.

-Polyurethane

Castor oil can be used as bio-based polyol in the polyurethane industry. The average functionality (number of hydroxyl groups per triglyceride molecule) of castor oil is 2.7, so it is widely used as rigid polyol and coating.[Fromting,1988]

-Industry

Castor oil has numerous applications in transportation, cosmetics and pharmaceutical, and manufacturing industries, for example: adhesives, brake fluids, caulks, dyes, electrical liquid dielectrics, humectants, Nylon 11 plastics, hydraulic fluids, inks, lacquers, leather treatments, lubricating greases, machining oils, paints, pigments, polyurethane adhesives, refrigeration lubricants, rubbers, sealants, textiles, washing powders, and waxes.

Since it has a relatively high dielectric constant (4.7), highly refined and dried castor oil is sometimes used as a dielectric fluid within high performance high voltage capacitors.[Azambuja,2006]

-Lubrication:

Vegetable oils, due to their good lubricity and biodegradability are attractive alternatives to petroleum-derived lubricants, but oxidative stability and low temperature performance limit their widespread use.^[32] Castor oil has better low temperature viscosity properties and high temperature lubrication than most vegetable oils, making it useful as a lubricant in jet, diesel, and race car engines[McGurie ,2004]. The viscosity of castor oil at 10 °C is 2,420 centipoise [Brady ,detals,1997]. However, castor oil tends to form gums in a short time, and its use is therefore restricted to engines that are regularly rebuilt, such as race engines. Biodegradability results in decreased persistence in the environment (relative to petroleum-based lubricants) in case of an accidental release. The lubricants company Castrol took its name from castor oil[Older,200].

Castor oil is the preferred lubricant for bicycle pumps, most likely because it does not dissolve natural rubber seals.

Early aviation and aeromodelling

Castor oil was the preferred lubricant for radial engines, such as the Gnome engine after that engine's widespread adoption for aviation in Europe in 1909. It was used almost universally by the radial engined Allied aircraft in World War I. Germany had to make do with inferior ersatz oil for its radial engines, which resulted in poor reliability

The methanol-fuelled two-cycle glow plug engines used for aeromodelling, since their adoption by model airplane hobbyists in 1948,

have used varying percentages of castor oil as a dependable lubricant. It is highly resistant to degradation when the engine has its fuel-air mixture leaned for maximum engine speed. Gummy residues can still be a problem for aeromodelling powerplants lubricated with castor oil, however, usually resulting in eventual ball bearing replacement when the residue accumulates within the engine's bearing races. One British manufacturer of sleeve valved four-cycle model engines has stated the "varnish" created by using castor oil in small percentages can improve the pneumatic seal of the sleeve valve, improving such an engine's performance over time.

-Derivatives:

Castor oil is the raw material for the production of a number of chemicals, notably sebacic acid, undecylenic acid, and nylon-11. A review listing numerous chemicals derived from castor oil is available. The production of lithium grease consumes a significant amount of castor oil. Hydrogenation and saponification of castor oil yields 12-hydroxystearic acid which is then reacted with lithium hydroxide or lithium carbonate to give high performance lubricant grease.

Turkey red oil, also called sulphonated (or sulfated) castor oil, is made by adding sulfuric acid to vegetable oils, most notably castor oil. It was the first synthetic detergent after ordinary soap. It is used in formulating lubricants, softeners, and dyeing assistants Ashford's[Ogunnyi,2006].

-Biodiesel:

Castor oil, like currently less expensive vegetable oils, can be used as feedstock in the production of biodiesel. The resulting fuel is superior for cold winters, due to its exceptionally low cloud and pour points.

Initiatives to grow more castor for energy production, in preference to other oil crops, are motivated by social considerations. Tropical subsistence farmers would gain a cash crop[Carmen,detals,2004]

-Intimidation in Fascist Italy and Spain:

In Fascist Italy under the regime of Benito Mussolini, castor oil was one of the tools of the Blackshirts. Political dissidents were force-fed large quantities of castor oil by Fascist squads. This technique was said to have been originated by Gabriele D'Annunzio. Victims of this treatment did sometimes die, as the dehydrating effects of the oil-induced diarrhea

often complicated the recovery from the nightstick beating they also received along with the castor oil; however, even those victims who survived had to bear the humiliation of the laxative effects resulting from excessive consumption of the oil[Bosworth,2002].