Food Oils and Fats: Chemistry and Technology

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Module 12: Packaging, Storage, & QA/QC

Lecture 58: Handling and Storage

Hello everyone, Namaskar. Now, in this 58th lecture of this course, in the next half an hour, we will talk about handling and storage of fats and oils.

Concepts Covered

- Handling of oils and fats
- Storage of oils and fats
- Guidelines for storage of liquid fats
- Guidelines for storage of solid fats

Here we will talk what are the various consideration that one should lo into for handling of oils and fats as well as storage of oils and fats and then guidelines for storage of liquid fats as well as guidelines for storage of solid fats.

Handling and storage of oils and fats

- Handling and storage of edible fats and oils are crucial aspects of maintaining their quality, flavor, and nutritional value.
- Fats and oils play a vital role in food preparation, enhancing taste and texture while providing essential nutrients. However, improper handling and storage can lead to rancidity, loss of flavor, and potential health risks.
- Therefore, it is important to understand the factors that affect the quality of edible fats and oils and the appropriate methods for their handling and storage.

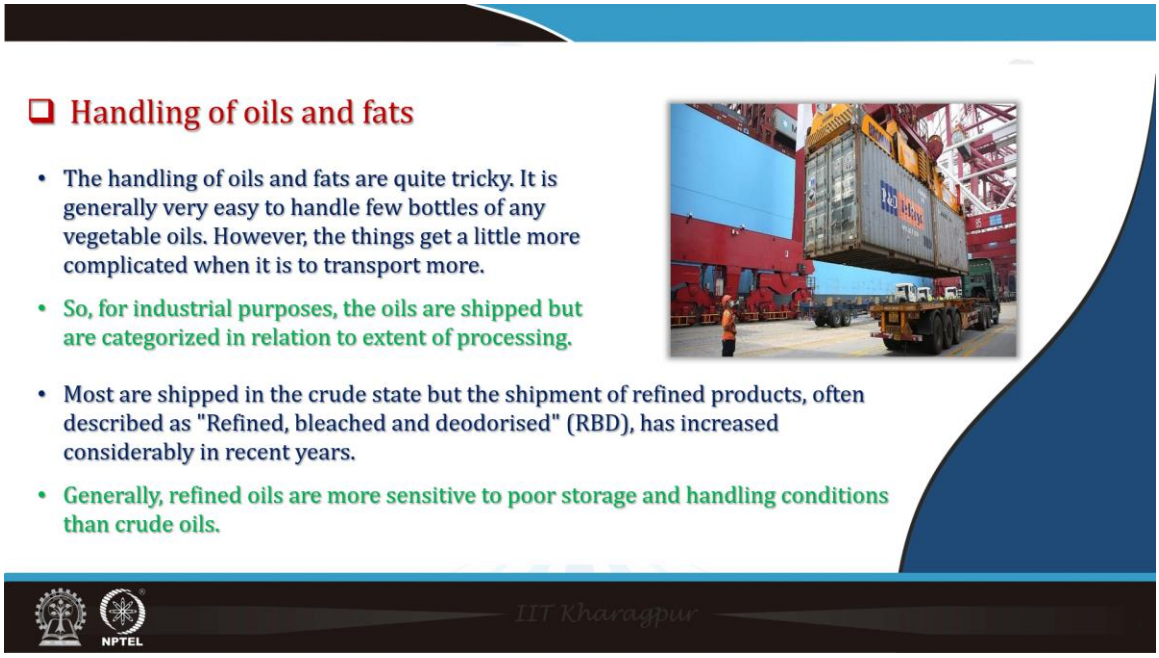
❑ Factors affecting oil quality during handling & storage

✓ Light ✓ Oxygen

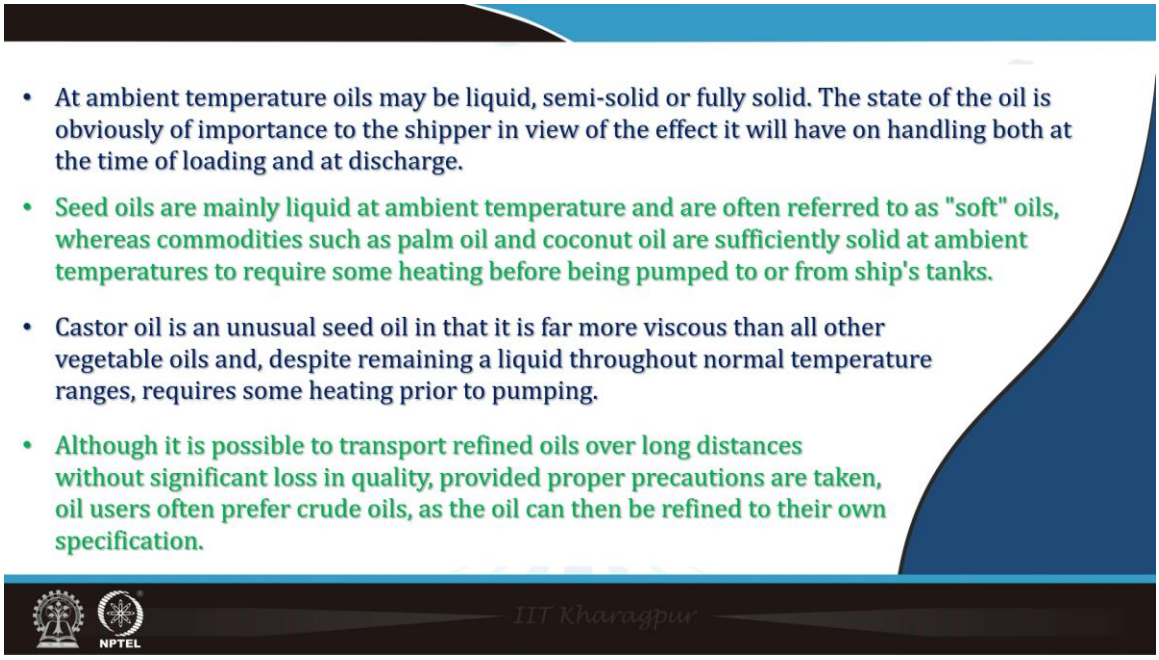
✓ Temperature ✓ Moisture

So, you know that handling and storage of edible fats and oils are crucial aspect of maintaining their quality, flavour and nutritional value. Fats and oils play a vital role in food preparation, enhancing taste and texture while providing essential nutrients. However, improper handling and storage can lead to rancidity, loss of flavour and potential health risks. Therefore, it is important to understand the factors that affect the quality of edible

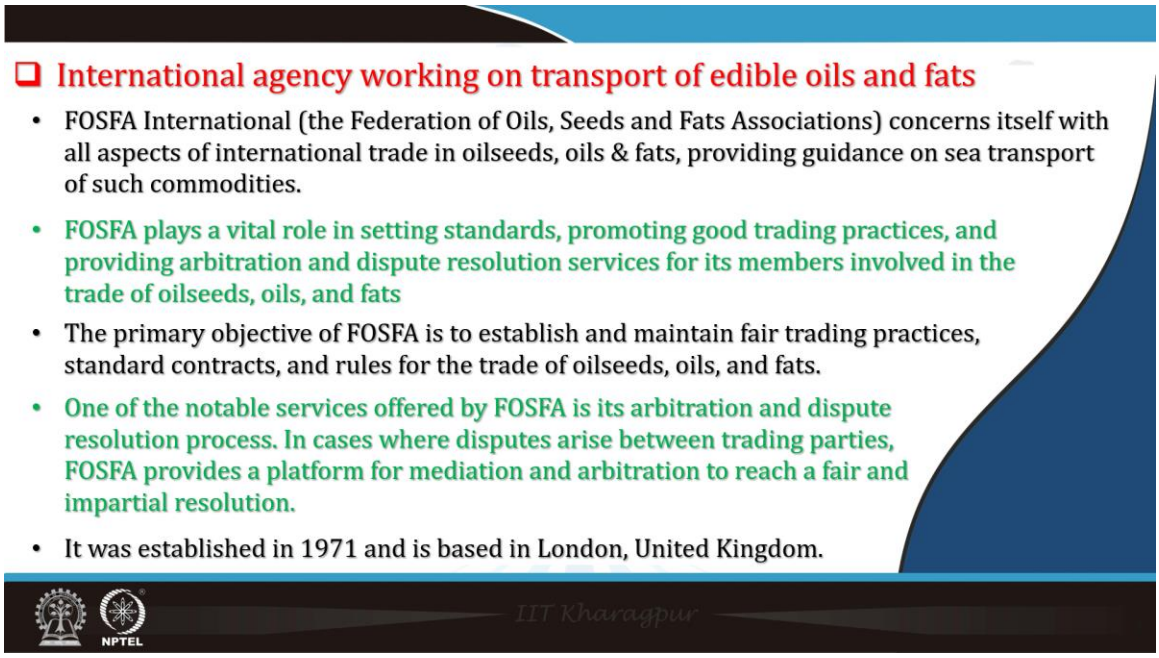
fats and oils and appropriate methods for their handling and storage. So, in the earlier classes also I discussed it, that there are major factors affecting the quality of oil during handling and storage are light, temperature, oxygen and moisture.



So, these four important factors must be taken into consideration while handling and storing the fat. The handling of oils and fats are quite tricky. It is generally very easy to handle a few bottles of any vegetable oil. However, the things get a little more complicated when it is to transport more amount, huge quantity in truck or in rail wagons etc. So, for industrial purposes the oils are shipped, but are categorized in relation to extent of processing. Both of the oils and fats are shipped in the crude state, but the shipment of refined product are often described as refined bleached and deodorized RBD oil has increased considerably in the recent years. Generally refined oils are more sensitive to poor storage and handling conditions than crude oil because if the handling conditions during transportation or even during storage, if the conditions are not properly maintained then the further development of acidity etc, oxidation products etc may take place and the whole purpose of your refining may get defeated. So, that is very important consideration.



At ambient temperatures, oil may be liquid, semi-solid or fully solid. So, the state of the oil is obviously, of importance to the in view of the effect that it will have on handling both at the time of loading as well as at the time of discharge. Seed oils are mainly liquid at ambient temperature and they are often referred to as soft oils. And, commodities such as palm oil, coconut oil etc which are sufficiently solid at ambient temperature and normally because they are solid, they might require some heating before being pumped to or from the seed tankers. Castor oil is an unusual seed oil that is far more viscous than all other vegetable oils and despite remaining a liquid throughout normal temperatures ranges, it requires some heating prior to pumping otherwise it is very highly viscous. Although it is possible to transport refined oils over long distance without significant loss in quality provided proper precautions are taken, oil users often prefer crude oil and the oil can then be refined to their own specification.

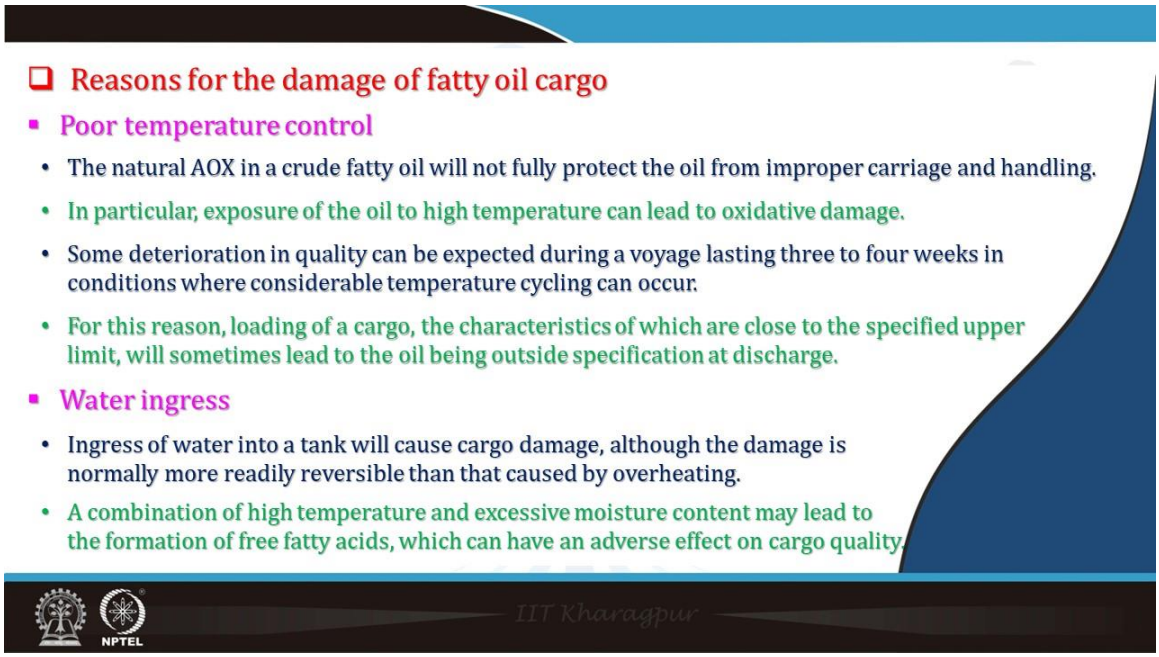


International agencies which are working on transport of edible oils and fats like FOSFA, FOSFA International it is the Federation of Oils, Seeds and Fat Associations. And this concerns itself with all aspects of international trade in oil seeds, oils and fats providing guidance on seed transport of such commodity. FOSFA plays a vital role in settling standards, promoting good trading practices and providing arbitration and dispute resolution services for its members involved in the trade of oil seeds, oils and fats. The primary objective of FOSFA is to establish and maintain fair trading practices, standard contracts and rules for the trade of oil seed, oils, oil seeds, oils and fats. One of the notable services offered by FOSFA is its arbitration and dispute resolution process. In cases where disputes arise between trading practices, FOSFA provides a platform for mediation and arbitration to reach a fair and impartial resolution. It was established in 1971 and is based in London, United Kingdom.

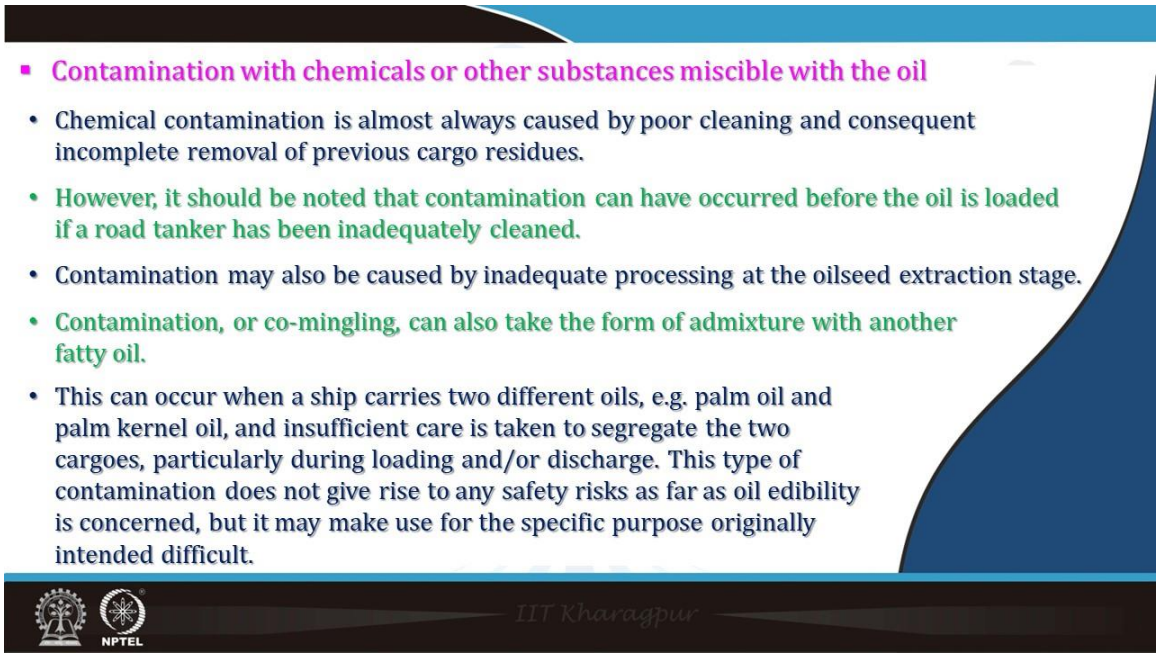
FOSFA recommended temperature for the carriage of oils and fats

OIL TYPE	DURING VOYAGE		AT DISCHARGE	
	Min°C	Max°C	Min°C	Max°C
Sunflower		Ambient	15	20
Soyabean		Ambient	20	25
Safflower		Ambient	15	20
Groundnut		Ambient	20	25
Rapeseed		Ambient	15	20
Maize (Corn)		Ambient	15	20
Palm	32	40	50	55
Palm Stearin	40	45	60	70
Palm Oleine	25	30	30	35
Coconut	27	32	40	45
Fish	20	25	25	30
Palm Fatty Acid Distillate	45	50	55	72

So here in this table, I have given you the FOSFA recommended temperature for carriage of oils and fats. So you can see that oil type like sunflower oil, soybean oil, safflower, groundnut, rapeseed and maize corn oil. So during transport, during wage, the temperature in this oil should be maintained in ambient conditions. Whereas, there is a palm oil, the transport temperature should be as according to FOSFA, it should be minimum 30°C to maximum 40°C. In case of palm is tearing, minimum temperature during wage should be 40°C and maximum should be 45°C. Palm oil, minimum temperature during wage should be 25°C and maximum 30°C. Palm that is coconut, it should be 27 and 32, minimum 27, maximum 32. For fish oil, it should be minimum 20 and maximum 25. For palm fatty acid distillates, minimum temperature during wage should be 45°C and maximum should be 50°C. But at the discharge point if you see for the sunflower oil as well as safflower oil, it should be minimum at discharge should be minimum 15°C and maximum 2°C. For soybean oil at discharge, minimum 2°C and maximum 25°C. The same for groundnut oil also 20-25°C and for rapeseed oil and maize corn oil, it should be again minimum 15°C and maximum 20°C. You can see for the palm oil, the minimum at discharge minimum is 50°C and maximum 55°C. For palm is tearing, minimum 60°C, maximum 70°C. For palm oil, minimum 30°C and maximum temperature at discharge should be 35°C. For coconut, it should be 40 minimum and 50, 45 maximum. For fish oil, minimum is 25 and maximum is 30°C and for palm fatty acid distillate, minimum is 55°C and maximum is 72°C at the discharge point. So, these are some of the major oils.



Now, let us talk about reasons for the damage of fatty oil carbon. Number 1 is the poor temperature control. The natural antioxidant in a crude fatty oil will not fully protect the oil from improper carriage and handling. In particular, exposure of the oil to high temperature can lead to oxidative change. Some deterioration in quality can be expected during a voyage lasting 3 to 4 weeks in condition where considerable temperature cycle can occur. For this reason, loading of a carbo, the characteristics of which are close to the specific upper limit will sometime lead to the oil being outside its specification at discharge. The other factor is the water ingress. Ingress of water into a tank will cause cargo damage although the damage is normally more readily reversible than that caused by overheating. A combination of high temperature and excessive moisture content may lead to the formation of free fatty acid which can have adverse effect on the cargo quality.



Then contamination with chemicals or other substances miscible with the oil. Chemical contamination is almost always caused by poor cleaning and consequent incomplete removal of previous cargo residues. However, it should be noted that the contamination can have occurred before the oil is loaded if a road tanker has been inadequately cleaned. Contamination may also be caused by inadequate processing of the oilseeds, particularly at the extraction stage. Contamination or co-mingling can also take place from the admixture of one oil into another. This can occur when a ship carries two different oils. For example, palm oil and palm kernel oil and insufficient care are taken to segregate the two carbons, particularly during loading and discharge. This type of contamination does not give rise to any safety risk as far as the oil edibility is concerned, but it may make use of for the specific purpose originally intended difficult.

- **Adulteration**
  - Adulteration, the deliberate mixing of two low-valued oils to simulate the composition of a more expensive product, has been largely eliminated by development of sophisticated techniques for the characterization of oils.

- **Admixture**
  - Ships carrying parcels of different oils must be meticulous in preventing cross-contamination due to faulty valves or by a failure to properly clean lines between discharging different parcels.
  - Although different oils are compatible, cross-contamination can seriously affect the end use of a particular product and thus give rise to a substantial claim and possible arbitration.

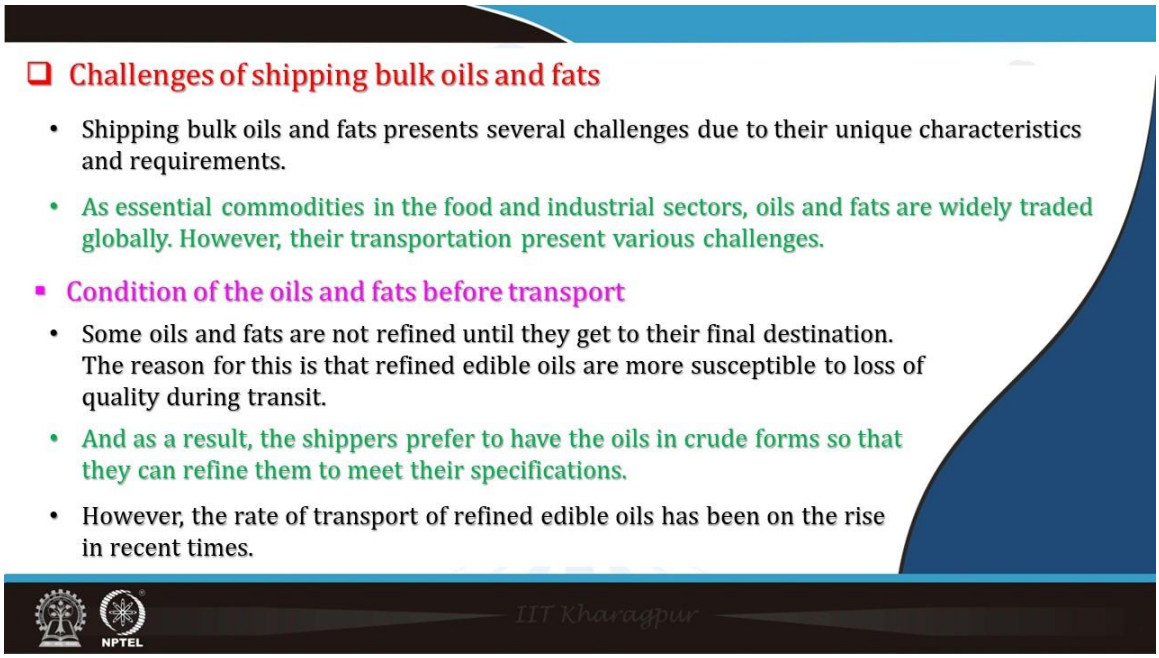
Then, adulteration is another reason because adulteration is the deliberate mixing of two low-valued oils to simulate the composition of a more expensive product has been largely eliminated by development of sophisticated techniques for the characterization of the oil. Then admixture that is ships carrying parcels of different oils must be meticulous in preventing cross contamination due to the faulty walls or by failure to properly clean lines between the discharging different parcels. Although different oils are compatible, cross contamination can be seriously affected in use of a particular product and thus it gives rise to a substantial claim and possible arbitration.

	Storage and bulk shipments		Loading and Discharge	
Oil or fat	Min °C	Max °C	Min °C	Max °C
Castor oil	20	25	30	35
Coconut oil	27	32	40[1]	45[1]
Cottonseed oil	Ambient	Ambient	20	25[4]
Fish oil	20	25	25	30
Grapeseed oil	Ambient	Ambient	10	20[4]
Groundnut oil	Ambient	Ambient	20	25[4]
Hydrogenated oils	Various	–	Various	–[2]
Illipe butter	38	41	50	55
Lard	40	45	50	55
Linseed oil	Ambient	Ambient	10	20[4]
Maize (corn) oil	Ambient	Ambient	10	20[4]
Olive oil	Ambient	Ambient	10	20[4]
Palm oil	32	40	50	55
Palm olein	25	30	32	35
Palm stearin	40	45	60	70[3]
Palm kernel oil	27	32	40[1]	45[1]
Palm kernel olein	25	30	30	35
Palm kernel stearin	32	38	40	45
Rapeseed/low erucic acid rapeseed oil	Ambient	Ambient	10	20[4]
Safflower oil	Ambient	Ambient	10	20[4]
Sesame oil	Ambient	Ambient	10	20[4]
Sheanut butter	38	41	50	55
Soyabean oil	Ambient	Ambient	20	25[4]
Sunflower oil	Ambient	Ambient	10	20[4]
Tallow (for voyages of 10 days or less)	Ambient	Ambient	55	65
Tallow (for voyages of more than 10 days)	35	45	55	65

- **FAO recommended temperatures during storage, transport, loading and discharge for edible oil's**
  - ✓ The Food and Agriculture Organization of the United Nations (FAO) recommends the practice for storage and transport of edible fats and oils (CAC/RCP 36-1987).
  - ✓ It gives guidance on the maximum temperature required for the various grades during transit and while loading and discharging.

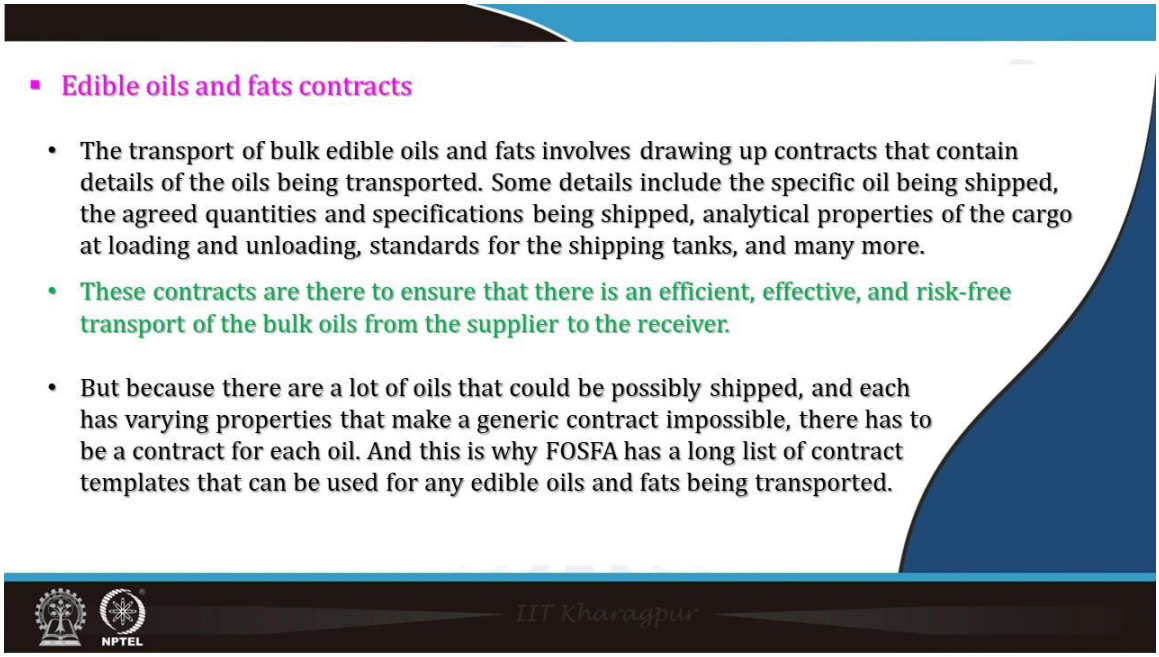
http://www.chemicaltankerguide.com/handling-oils-&-fats.html

The FOA also has recommended temperature during storage, during transport, loading and discharge for the edible oils. The Food and Agriculture Organization of the United Nations recommends the practice for storage and transport of edible fats and oils as detailed in CAC/RCP 36-1987. It gives guidance on the maximum temperature required for the various grades during transit and while loading and discharging. For example, in the table, information is given for the storage and bulk shipment for the coaster soil and coconut oil. There is minimum temperature for coaster oil at storage should be 20°C maximum 25 whereas, for coconut oil minimum can be 27 and maximum 32. But for the same at loading and discharge for coconut oil it should be 40 should be minimum and 45 should be maximum at the discharge And the other oil grapeseed, groundnut etc already it is also almost similar to those recommended by the phosphor. Then like here you can see the palm kernel oil that is the minimum temperature at storage of bulk segments is 27°C and maximum 32°C , but at the discharge it will be minimum 40 and maximum 45 Similarly for sesame oil it is ambient condition during storage and the at loading at discharge it should be 10 should be minimum and 20 should be maximum. This is both for sesame and sunflower oil for this Tallow (for voyage of 10 days or less) it should be the for storage it will be ambient, but at the loading and discharge it should be minimum 55 and maximum it can go up to 65. And the same for loading and discharge of Tallow (for voyage more than 10 days) it can be and the for storage if it is more than 10 days for Tylo it should be minimum 35 and maximum 45 that temperature may range during this. Only oil is the storage for minimum as it should be ambient, but for that loading and discharge it should be temperature range of 10°C to 20°C minimum 10°C and maximum 20 °C.

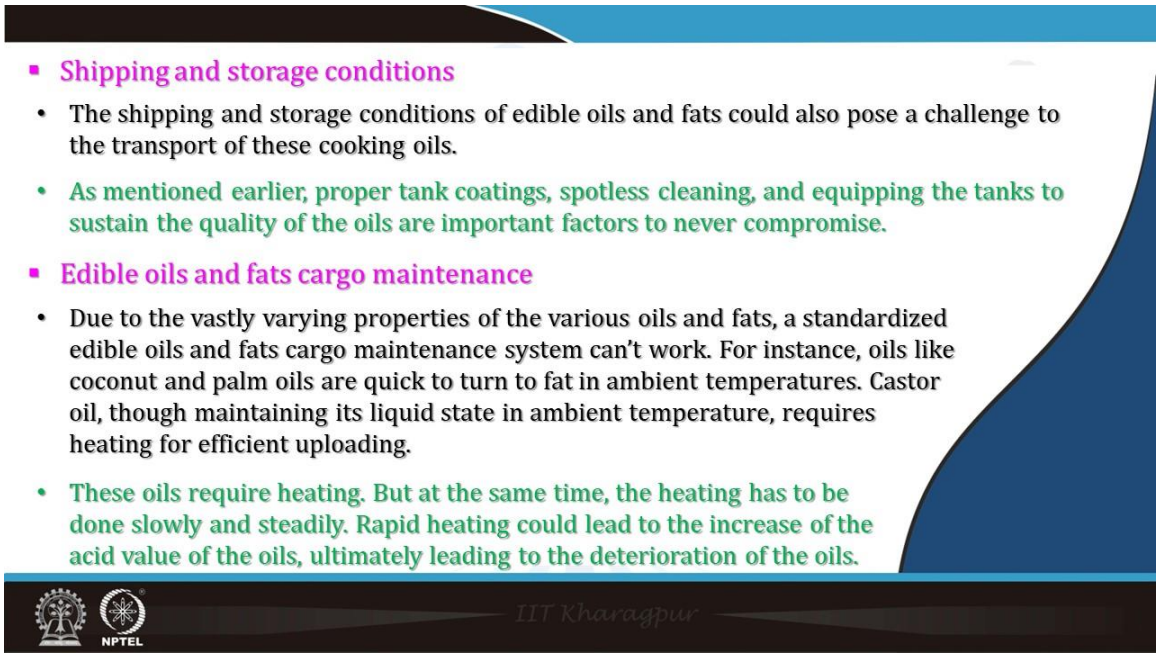


Then let us talk about challenges of shipping bulk oil and fats. Shipping bulk oils and fats present several challenges due to their unique characteristics and requirements. As essential commodities in the food and industrial sector, oils and fats are widely traded

globally. However, their transportation present various challenges like the condition of the oil and fat before transport how was it and therefore, to maintain it during the transportation. Some oils and fats are not refined until they go get to their final destination and the reason for this is that refined oils are more susceptible to loss during the transit quality loss during transit. As and as a result the shippers prefer to have the oils in crude form so that they can refine them to meet their specification. Otherwise if the refined oil being stored then further development of resins may cause additional secondary refining and which will unnecessary increase the cost. However, the rate of transport of refined oil has been on the rise in the recent years because thanks to the new technology which can prevent that is the resins or oxidation of the fats and oil during transit.



Then edible oils and fats contracts contain details of the oil being transported. Some details include the specific oil being shipped and agreed quantities and specification being shipped analytical properties of the cargo at loading and unloading standards for shipping tanks and many more. These contracts are there to ensure that there is an efficient, effective and risk-free transport of the bulk oils from the supplier to the receiver, but because there are a lot of oil that could be possibly shipped and each has varying properties that make a generic contract impossible. There has to be a contract for each oil and that is why FOSFA have a long list of contract template that can be used for any edible oil and fat being transported.



Then shipping and storage conditions and the challenge it should be the shipping and storage conditions for edible oils and fats could also always to the challenge to the transport of these oils. Proper tank coatings, spotless cleaning and equipping the tanks to system or sustain the quality of the oils are important factor to never compromise. Edible fats and oils cargo maintenance is another important it is also a challenging task due to the vastly varying properties of the various oils and fats. A standardized edible oil and fat cargo maintenance system cannot work. For instance, oil like coconut and palm are quick to turn into fat at ambient temperature. The oil though maintaining its liquid state ambient temperature requires heating for efficient uploading. So, these oils require heating, but at the same time the heating has to be done slowly and steadily. Rapid heating could lead to the increase of the free fatty acid or acid value of the oil ultimately leading to the deterioration of the oil. So, these things should be taken care of.

Storage of oils and fats

- Proper storage of edible oils and fats is essential to preserve their quality, flavor, and nutritional value. Inadequate storage conditions can lead to the development of off-flavors, rancidity, and degradation of essential nutrients.
- To ensure the longevity of edible oils and fats, it is crucial to follow appropriate storage practices

Storage tanks

- The most suitable shape is the vertical circular cross-section tank with a self-supporting fixed roof, preferably convex in shape.
- Where possible, tall, narrow tanks are preferred, to minimize exposed surface areas.
- Tank bottoms should be conical or sloped to be self – draining.

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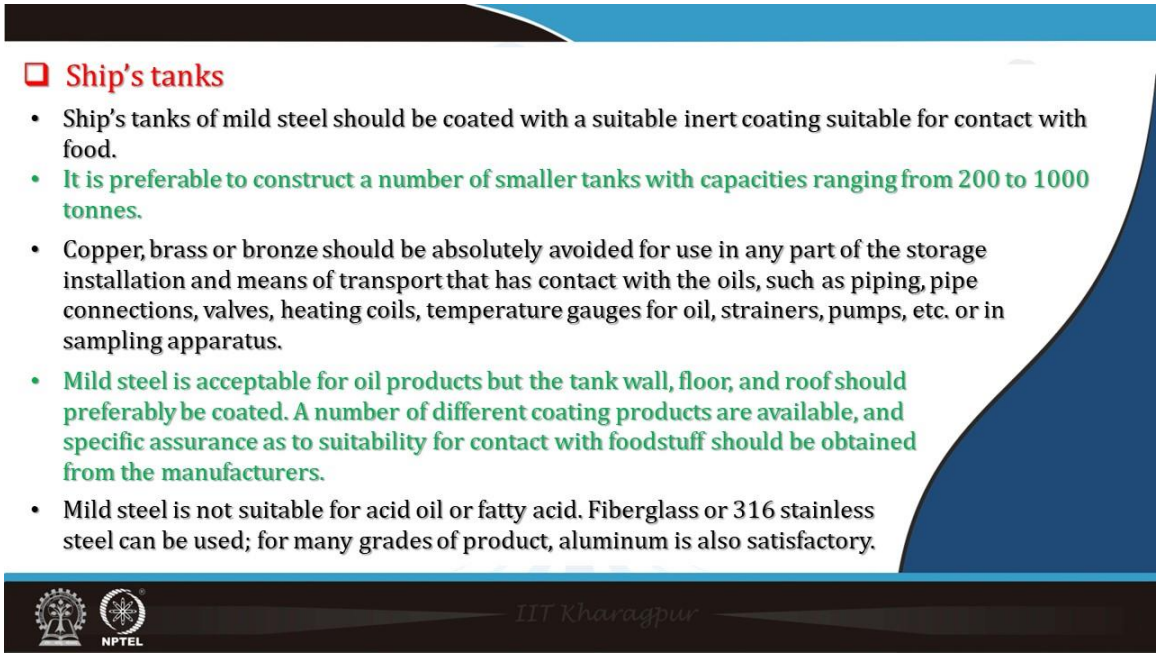
- For each installation, the storage capacity is related to the expected storage period, the rate of turnover and the number of different products to be handled.
- For refineries or end users, the capacities of storage tanks should be small, and it is desirable to have a number of tanks ranging from 200 to 1000 tonnes.
- For export and import tank farms, different capacities for various products can be used.
  - ✓ Crude liquid oils : 1000 to 5000 tonnes.
  - ✓ Crude non-liquid oils and refined oils : 500 to 2000 tonnes.
  - ✓ High melting fats such as palm stearin, tallow, hydrogenated oils : 500 to 1000 tonnes.
  - ✓ Fatty acid distillate or acid oil : 500 tonnes or larger where turnover is large.

For each installation, the storage capacity is related to the expected storage period, the rate of the turnover and the number of different products to be handled. For refineries or end-users, the capacities of the storage tank should be small and it is desirable to have a number of tanks ranging from 200 to 1000 tons. For export and import of tank farms, different capacities for various products can be used like for crude liquid oils, there is a tank for up to 1000 to 5000 tons capacity can be used. For crude, non-liquid oils and refined oils, it is from 500 to 2000 ton capacity. High melting fats such as palm stearin, tallow, hydrogenated oils, the tank capacity is normally 500 to 1000 tons. Fatty acid distillate or acid oils is 500 tons or larger, where turnover is large. So, for export, all these bearing capacity depending upon the product of bearing farms can be used.



In addition, ship tanks of mild steel should be coated with suitable inert coating, which is suitable for contact with the food. It is preferable to construct a number of smaller tanks with capacity ranging from 200 to 1000 tons. Copper, brass or bronze should be absolutely avoided for use in any part of the storage and means of transport that has contact with the oil such as piping, pipe connections, valves, heating coils, temperature gauze for oil, strainers, pumps etc or in even sampling apparatus also, there should be any contamination with copper, bronze etc should be avoided. Mild steel is acceptable for oil products, but the tank wall, floor, roof should preferably be coated. A number of different coating practices are available and specific assurance so as to suitability for contact with the food stuff should be obtained from the manufacturer. Mild steel is not suitable for acid, oil or fatty acids. Fiber, brass or 316 stainless steel can be used for many grades of products. Aluminium is also satisfactory.

Then heater installation in tank, sometime in the tank there are heating systems or devices are provided particularly for removal of the solid fats etc for heating of the oil before it unloading. So, these are two heating of the installations also becomes necessary to maintain the proper temperature of oil and to ensure its quality and usability. Edible oils may solidify or become more viscous at lower temperature making it difficult to handle or pump. So, heating systems are designed to provide controlled and uniform heat distribution throughout the storage tank. Maintaining the oil to maintain in a liquid state at the facilitating easy extraction and transfer when needed. All tanks for solid or semi-solid products is installed with heating facility in order to obtain homogeneous products when they are transferred or unloaded. So, heating coil should be of mild steel or mild steel tanks and the of stainless steel for coated and stainless steel tankage.

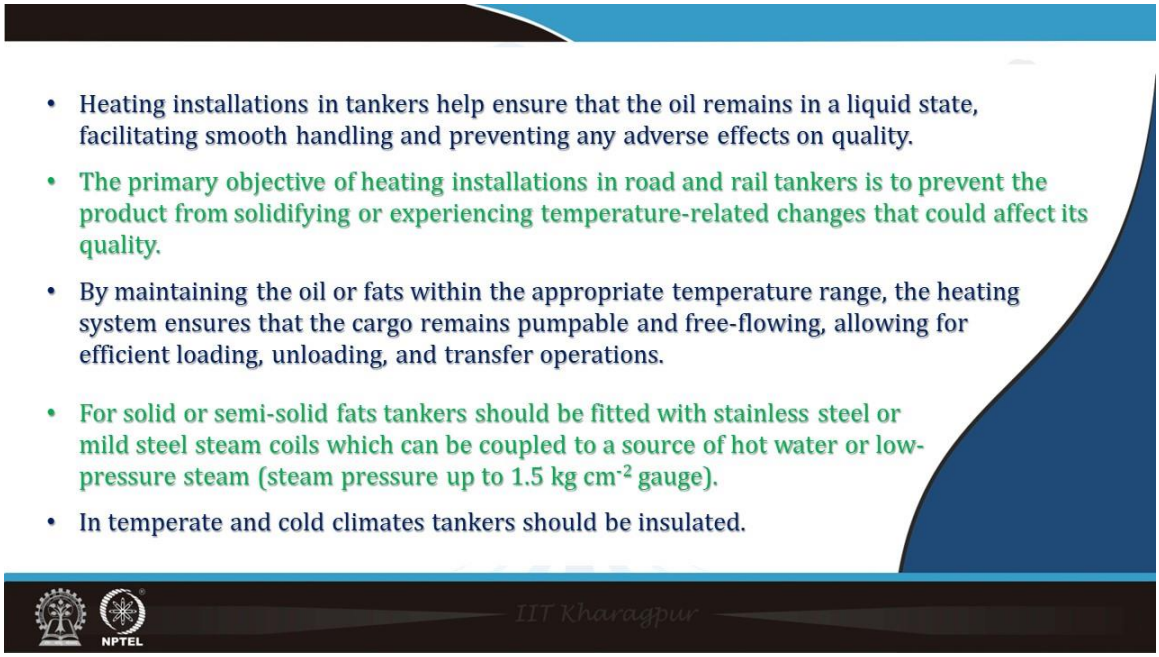
- **Bare hot water pipes**
  - Bare hot water pipes-based heating is one method used to heat edible oil in storage tanks.
  - This system involves circulating hot water through pipes that are in direct contact with the oil, transferring heat to the oil and maintaining it at the desired temperature.
  - Heating by hot water (controlled at 80°C) circulated through the coils is the best procedure because it is least likely to cause local overheating.
- **Bare steam pipe**
  - Bare steam pipes-based heating is another method commonly used to heat edible oil in storage tanks.
  - This system involves circulating steam through pipes that are in direct contact with the oil, transferring heat to the oil and maintaining it at the desired temperature.

Then bare hot water pipes, this bare hot water pipes based heating is one method which is used to heat edible oil in storage tank. This system involves circulating hot water through pipes and that are in direct contact with oil transferring heat to the oil and maintaining it at the desired temperature. Heating the hot water that is where controller at 80°C circulated through the oil is the best procedure because it is least likely to cause local overheating. Then bare steam pipe, there is a bare steam pipe based heating is another method commonly used to heat edible oil in storage tank. This system involves circulating heat or circulating steam through pipes that are in direct contact with the oil. So, transferring the heat to the oil and maintaining it at the desired temperature.

- Heating by steam with pressure up to 1.5 kg cm^{-2} gauge (temp. 127°C). The heating coils are normally mild steel 5 cm (2") bare pipes and should rest on supporting legs about 7.5 cm (3") above base of tank.
- Where no provision existed for mixing the oil in tank, a maximum heating rate of 5 °C/24 h should be maintained to avoid local overheating at the coil surface.
- **Heating installations – road and rail tankers**

- Heating installations in road and rail tankers for edible oil and fats play a crucial role in maintaining the quality and usability of these products during transportation.
- Edible oils and fats can solidify or become more viscous at lower temperatures, making it challenging to load, unload, and transport them efficiently.

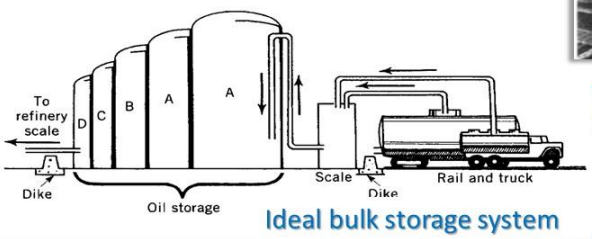
Heating by steam with pressure up to 1.5 kg per centimeter square gauge may be temperature of 127°C. The heating coils are normally mild steel 5 centimeter square or pipes and should be rest and supporting legs of about 7.5 centimeter that is 3 inch above the base of the tank. Here no provision existed for making the oil in tank. A maximum heating rate of 5°C per every 24 hours should be maintained to avoid local overheating at the coil surface. Then heating installation in the road and rail tankers. Here you can see in the figure that heating installation in the road and rail tankers for edible oils and fat play a crucial role in maintaining the quality and usability of these products during transportation. So, edible oils and fat can solidify or become more viscous at lower temperature making it challenging to load unload and transport them efficiently.



So, from this point of view a suitable heating system must be installed. So, heating installations in tanker help ensure that the oil remains in a liquid state facilitating a smooth handling and preventing any adverse effect on quality. The primary objective of the heating installation in road and rail tanker is to prevent the product from solidifying or experiencing temperature related changes that could affect its quality. By maintaining the oil or fat within the appropriate temperature range, the heating system ensures that the cargo maintains or cargo remains pumpable and free flowing allowing for efficient loading unloading and transfer operations. For solids or semi solid fats tanker with it should be fitted with stainless steel or mild steel steamed coils which can be coupled to a source of hot water or low-pressure steam where steam pressure up to 1.5 kg per square centimeter can be used. In temperate and cold climates even tanker should be insulated.

Typical and ideal bulk storage and handling facilities

- Bulk storage and handling facilities are required by
  - ✓ Extraction plants and refineries
  - ✓ Industrial users of fats and oils
  - ✓ Tank farm operations



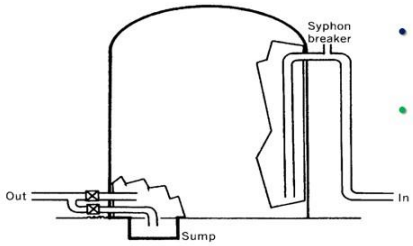
Ideal bulk storage system

Typical bulk storage and handling facility for finished products

List et al. (2020)

Then typical and ideal bulk storage and handling facilities for fuel oil you can see here. Bulk storage and handling facilities are required by extraction plants and refineries, industrial uses of fats and oils as well as tank farm operations. So, ideal bulk storage system has been shown in this figure that is you can see the rail and truck, there is pike and scale.

- Key features in the ideal bulk-storage system include: (1) storage tanks and piping for each type of crude oil to be stored and handled, (2) an inventory control system that allows an accurate measure of crude oil coming into refinery and to refining operation, and (3) a spill prevention, containment, and control system.
- Items (1) and (2) are particularly important in preventing comixing, and mixing of old product with new where the deteriorated one could catalyze oxidation.
- Typical piping arrangement for a crude oil storage tank

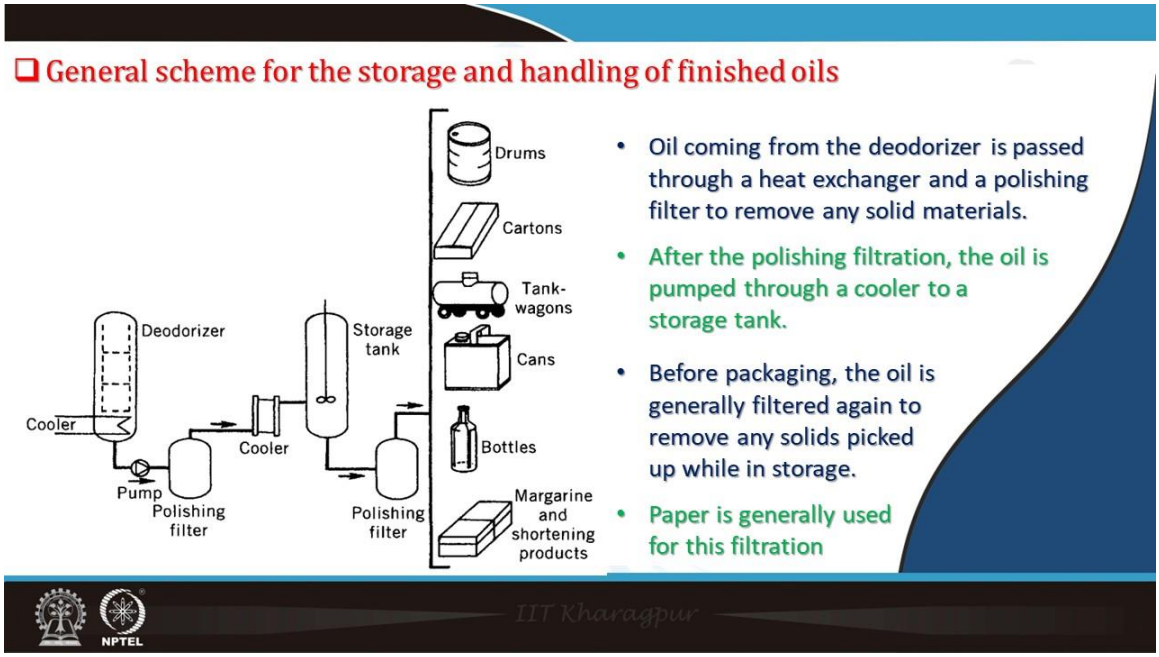


- Key features include an inverted U-shaped piping arrangement with a syphon breaker at the top.
- This lessens the possibility of oil in a full tank accidentally flowing to a tank containing less oil and it also permits filling a tank from the bottom, thereby minimizing exposure of the oil to air.

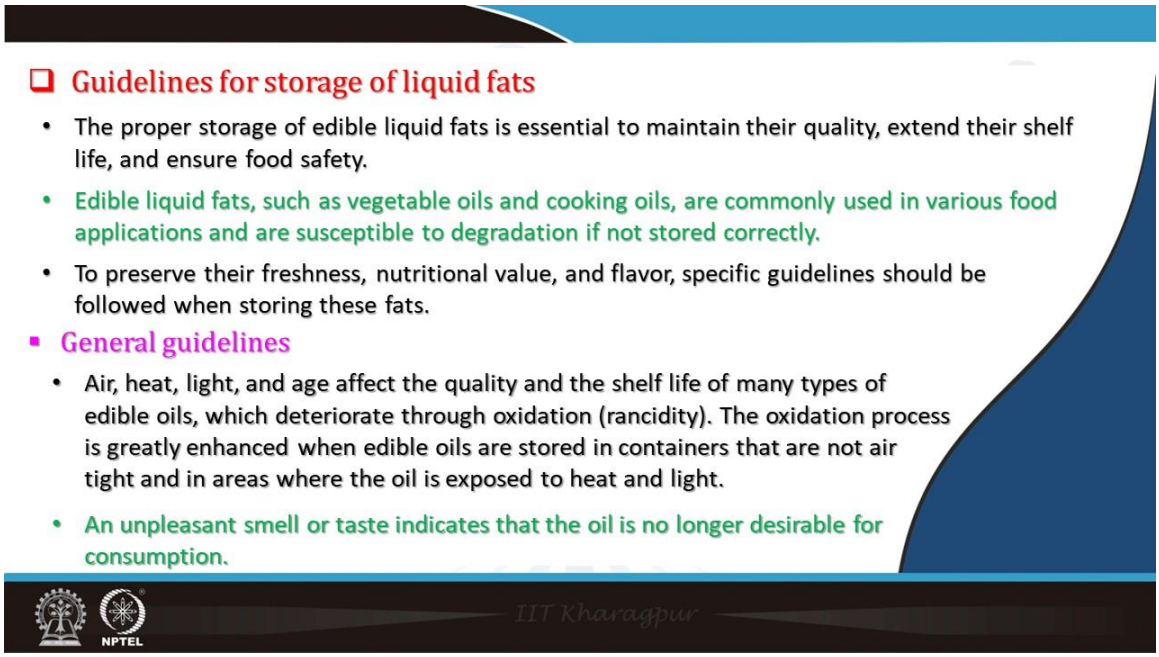
List et al. (2020)

The key features in the ideal bulk storage system include that is storage tanks and piping for each type of crude oil to be stored and handled. Second that is there should be an inventory control system that allows an accurate measure of crude oil coming into the refinery and to the refining operations. Finally, third important stage is the spill prevention that is

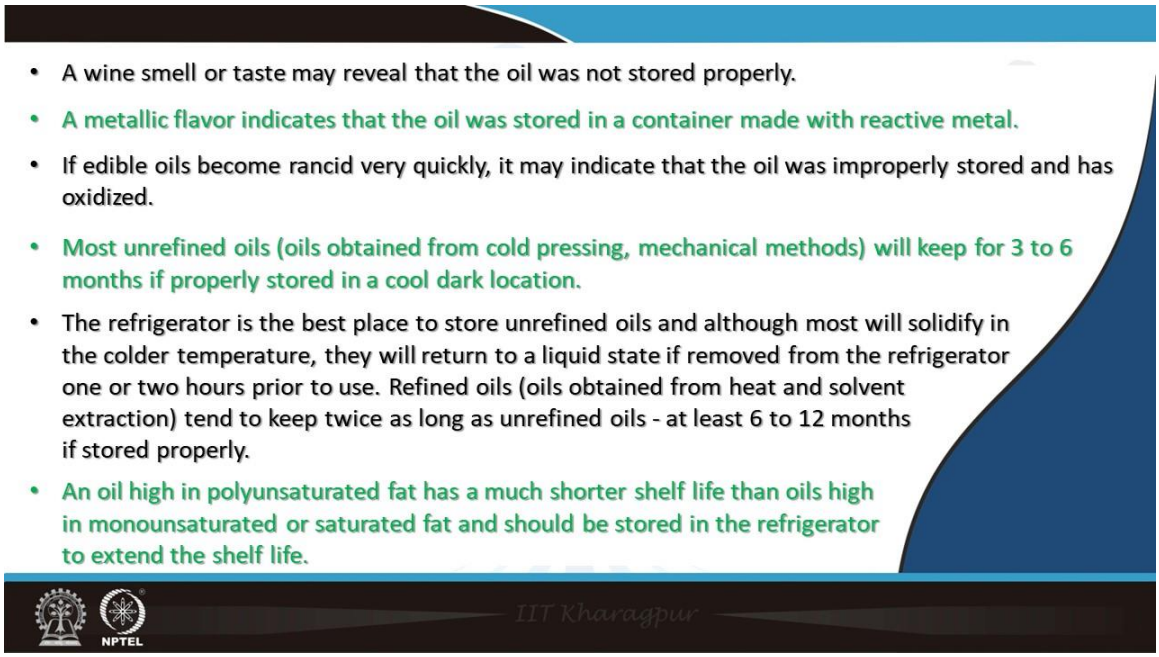
containment that is there should be a control system for spill prevention containment. So, item 1 and 2 that is storage tanks with piping as well as inventory control these are the very important in preventing co-mixing and mixing of old product with new where the new product is being used. So, the typical piping arrangement for crude oil storage tank is shown here in the picture that is oil in there is a siphon breaker and it oil goes out like the key feature include an inverted U-shaped piping arrangement with a siphon breaker at the top And this lessens the possibility of oil in a full tank accidentally flowing to a tank containing less oil and it also permits filling a tank from the bottom thereby minimizing exposure of the oil to air.



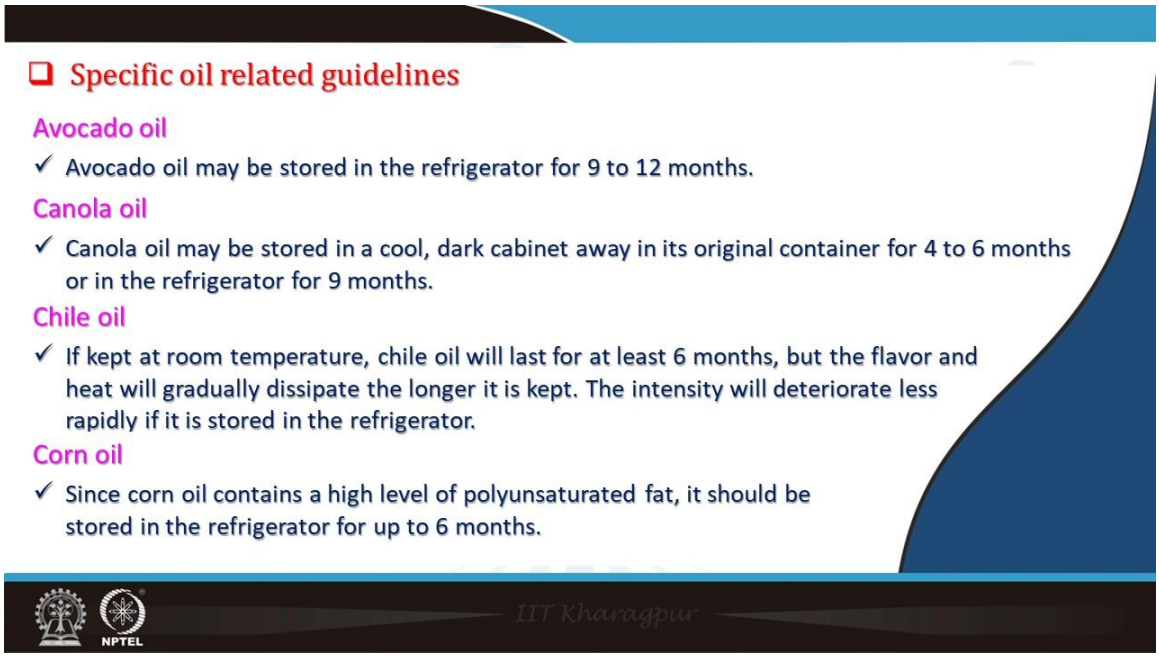
So, general scheme for the storage and handling of finished oil that is oil coming from the deodorizer is passed through a heat exchanger and a polishing filter to remove any solid material etc. Then after the polishing filtration the oil is pumped through a cooler and it goes to the storage tank and from the storage tank that is before packaging the oil is filtered again to remove any solid etc and then it is passed through another again polishing filter. And finally, it is sent to the packaging where paper is generally used for in the filtration polishing filter the paper is used and after that it is sent for the packaging depending upon the type of the product either drums, cartoons, tank wagons, cans, bottles or margarine and shortening products structure and their packaging etc is followed.



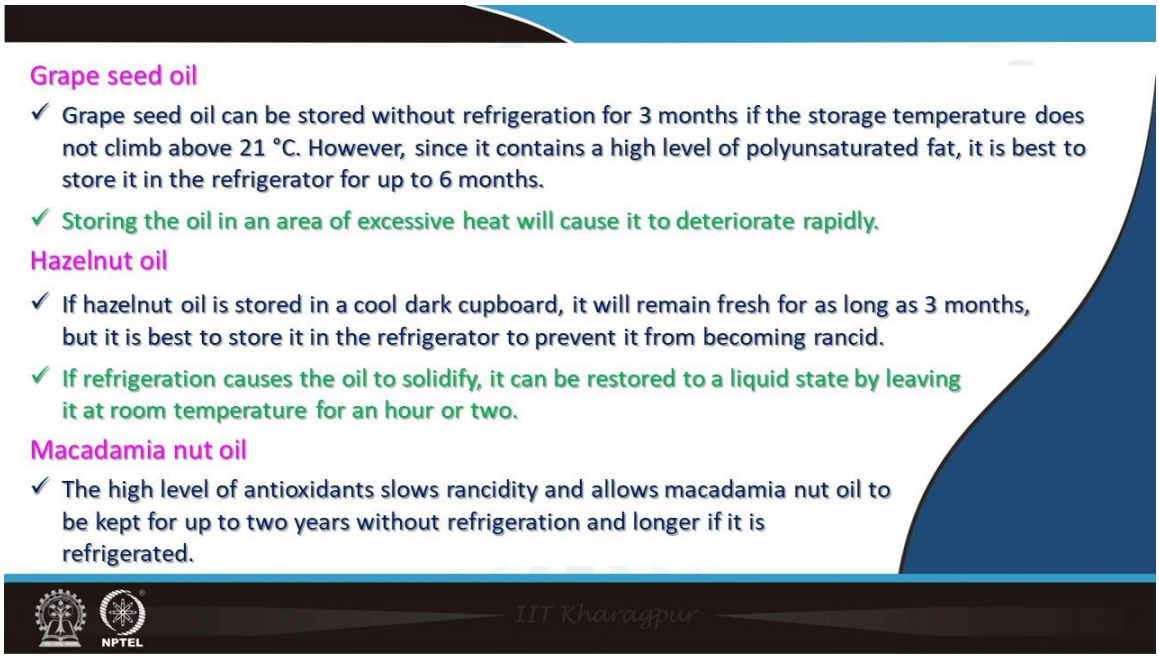
Now, let us talk about the general guidelines for storage of some of the liquid fats like the proper storage of edible liquid oil or fat is essential to maintain their quality extend shelf life and assure food safety. Edible liquid fats such as vegetable oils are commonly used in various food applications and are susceptible to degradation if not stored current properly. So, to preserve their freshness nutritional value and flavor a specific guidelines should be followed when storing these fat. So, general guideline is that is air, heat, light, and age affect the quality of the shelf life of the product, edible oil and which deteriorate the oxidation or through oxidation surfaces. So, oxidation process is generally are greatly enhanced when edible oils are stored in container that are not airtight and in areas where the oil is exposed to heat and light. So, an unpleasant smell of these indicates that the oil is no longer desirable for consumption.



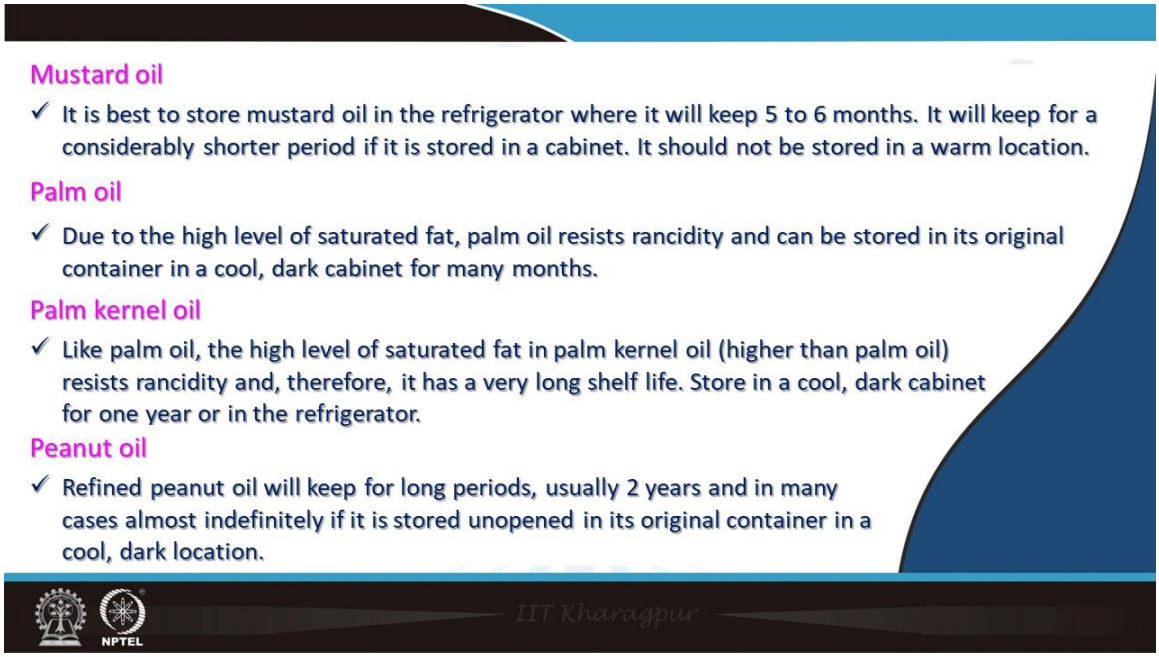
So, even a wine smell or taste may reveal that the oil was not properly stored. A metallic flavor indicates that the oil was stored in a container made with reactive metals. If edible oil becomes rancid very quickly, it indicates that the oil was improperly stored and has oxidized. Most refined oils like oils obtained from cold pressing mechanical methods etc it will keep for 3 to 6 months if properly stored in a cool dark location. The refrigerator is the best place to store refined unrefined oils and although most will solidify in cooler temperature, they will return to a liquid state if removed from the refrigerator 1 or 2 hours prior to their use. Refined oils that is oil obtained from heat and solvent extraction tend to keep twice as long as unrefined oil that is at least 6 to 12 months if stored properly. An oil high in polyunsaturated fat has a much shorter shelf life than the oil high in monounsaturated or saturated fats and they should be stored in a refrigerator to extend the shelf life.



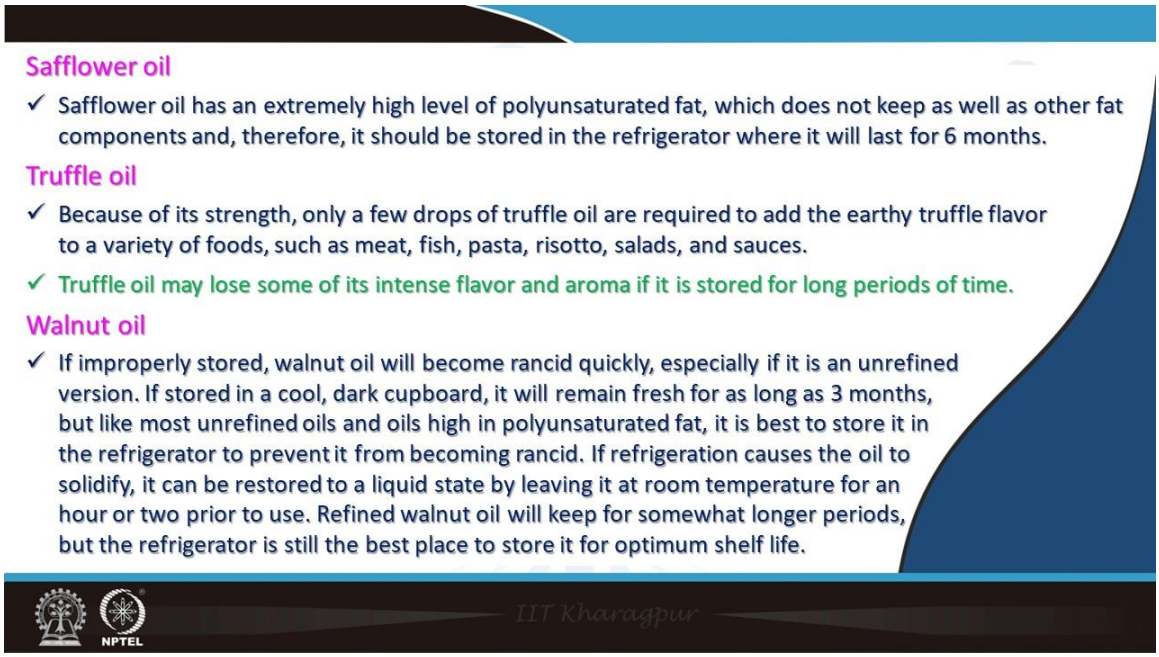
So, let us see the guidelines that is provided for a specific guidelines related to specific oil like avocado oil. This it should be stored in a refrigerator for about 9 to 12 months. Canola oil may be stored in a cool dark cabinet away in its original container for 4 to 6 months or in the refrigerator for 9 months. Chile oil if kept at room temperature it will last for 6 months, but the flavor and heat will gradually dissipate the longer it is kept. The intensity will deteriorate less rapidly if it is stored in a refrigerator. Corn oil contains a high level of polyunsaturated fat, it should be stored in a refrigerator for up to 6 months.



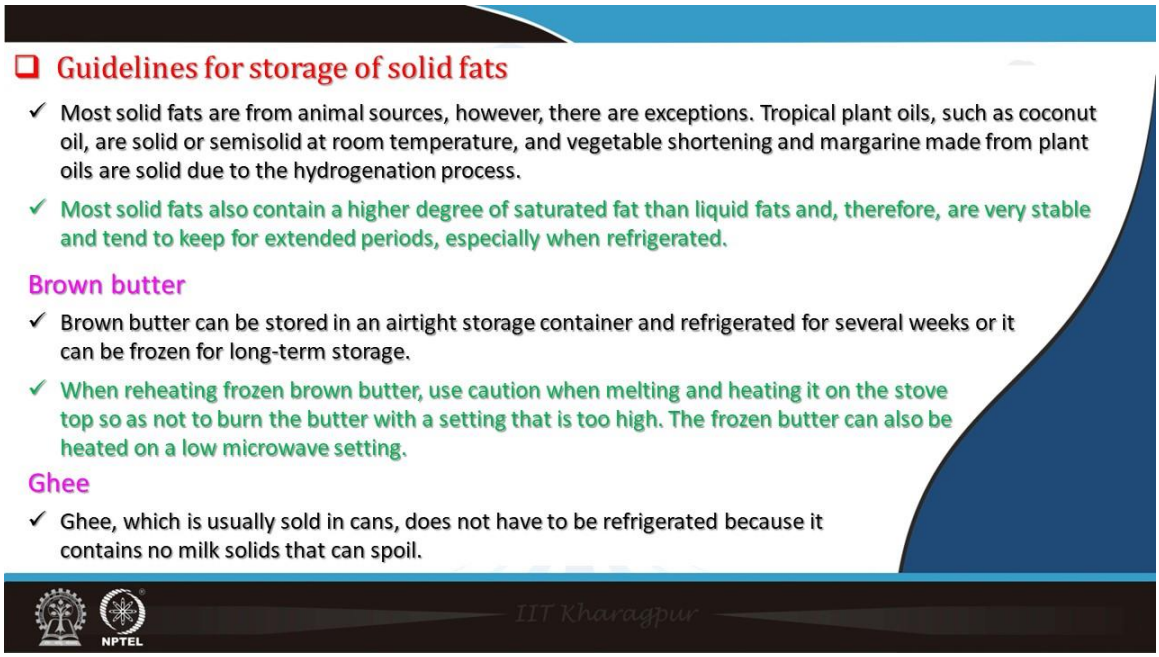
Grape seed oil can be stored without refrigeration for 3 months if the storage temperature does not climb above 21°C. However, since it contains a high level of polyunsaturated fat, it is best to store grape seed oil in a refrigerator for up to 6 months. Storing the grape seed oil in an area of excessive heat will cause it to deteriorate rapidly. Hazelnut oil is stored in a cool dark cupboard, it will remain fresh for as long as 3 months, but if it is best to store it in a refrigerator to prevent it from becoming rain seed. If refrigeration causes the oil to solidify, it can be restored for a liquid state by leaving it at room temperature for an hour or two. Macadamia nut oil the high level of antioxidant shows rancidity and allows macadamia nut oil to be kept for up to 2 years without refrigeration and longer it if it is refrigerated.



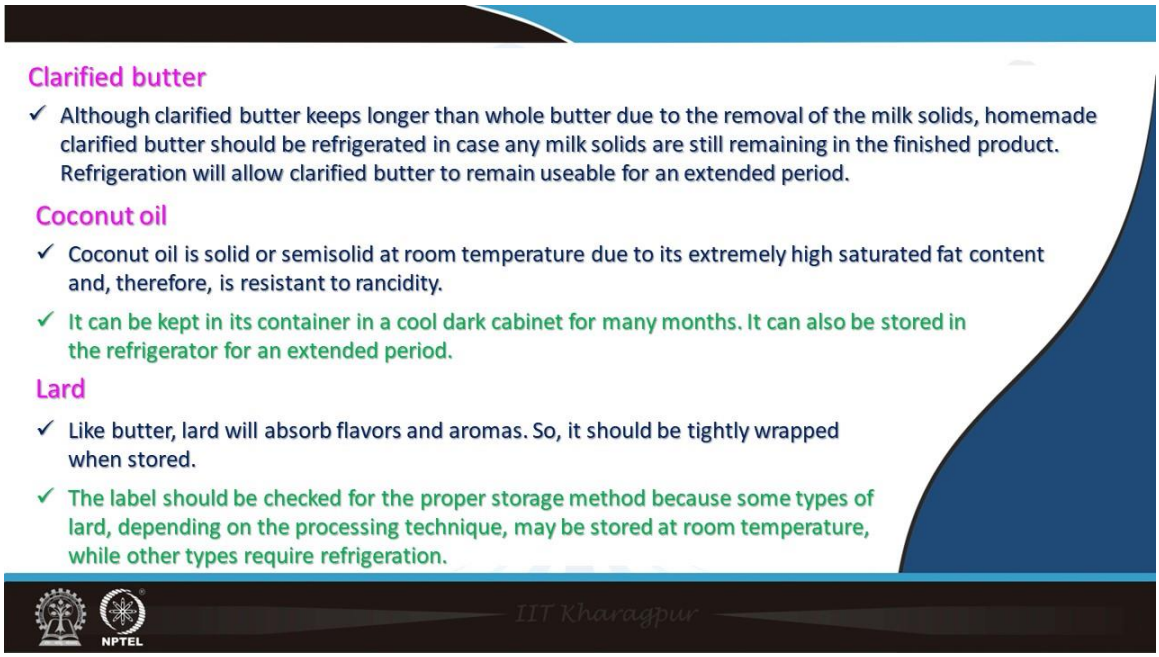
Mustard oil should be stored in refrigerator where it will keep for about 5 to 6 months. It will keep for a considerably shorter period if it is stored in a cabinet. So, it should not be stored in a warm location. Palm oil because of its high level of saturated fat, it resists rancidity and can be stored in its original container in a cool dark cabinet for many months. Palm kernel oil it is also high level of unsaturated high level of saturated fats are there. In some cases, it is higher than the palm oil. So, it also resists rancidity and therefore, it has a very long shelf life stored in a cool dark cabinet for 1 year or in the refrigerator even for more. Peanut oil there is refined peanut oil will keep for long period usually 2 years and in many cases almost indefinitely if it is stored unopened in its original container in a cool dark location.



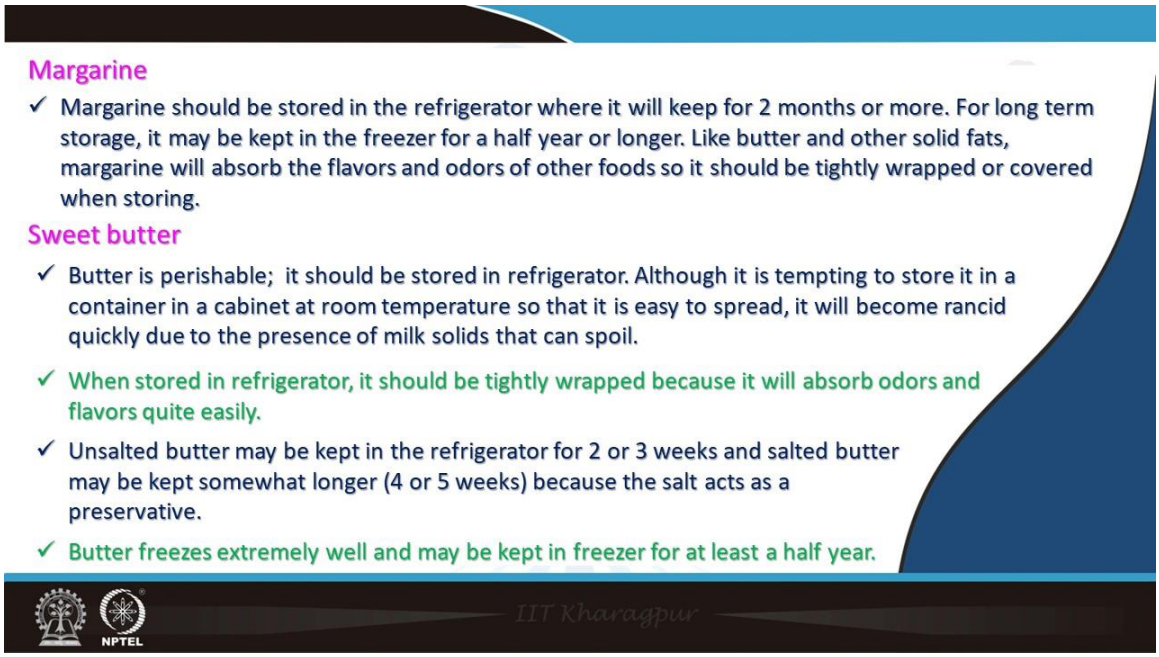
Shafflower flour oil has an extremely high level of polyunsaturated fat which does not keep as well as the fat components and therefore, it should be stored in a refrigerator where it will keep for more than 6 months. Truffle oil because of its strength only a few drops of truffle oil are required to add early truffle flavour to a variety of foods such as meat, fish, pasta, salads, sauces etc. So, truffle oil may also lose some of its intense flavour and aroma if it is restored for long period of times. Walnut oil if properly stored, walnut oil will become rancid quickly if it is improperly stored especially if it is an unrefined version. So, if stored in a cool dark cupboard it will remain fresh for as long as 3 months, but like most unrefined oils and oils high in polyunsaturated fat it is best to store it in the refrigerator to prevent it from becoming rancid. If refrigeration causes the oil to solidify it can be restored to a liquid state by leaving it at room temperature for an hour or two prior to use. Refined walnut oil will keep for somewhat longer period, but the refrigerator is still the best place to store it for optimum shelf life.



Now, let us briefly talk about guidelines for storage fat storage of solid fats and most solid fat as you are know that is they are from animal sources. However, they are exceptions typical of tropical plant oil such as coconut oil or solid or semi solid at room temperature and vegetable shortening and margarine made from the plant oils or solid due to hydrogenation process. So, most solid fats also contain a higher degree of saturated fat than the liquid fat and therefore, they are very stable and then tend to keep for extended period especially when refrigerated. Brown butter can be stored in air tight storage container and refrigerated for several weeks or it can be frozen for long term storage. When reheating frozen, but brown butter use caution when melting and heating it on a stove top stove top as so as not to burn the butter with a setting that is too high. The frozen butter can also be heated on a low microwave setting. Ghee which is usually solid in cans does not have to be refrigerated because it contains no milk solids and that can spoil.



Clarified butter although clarified butter keeps longer than the whole butter due to the removal of the milk solids, homemade clarified butter should be refrigerated in case milk solids are still remaining in the finished product because refrigeration will allow clarified butter to remain usable for an extended period. Coconut oil is solid or semi solid at room temperature due to its extremely highly saturated fat content and therefore, it resist to rancidity. It should be kept in a container in a cool dark cabinet for many months. It can also be stored in the refrigerator for an extended period. There is a like butter lard will absorb flavors and aromas. So, it is could be tightly wrapped when used. The label should be checked for the proper storage method because some types of lard depending on the processing technique may be stored at room temperature while other required refrigeration.



Margarine should be stored in the refrigerator where it will keep for 2 months or more. For long-term storage, it may be kept at a freezer for a half year or longer. Like butter and other solid fats, margarine will absorb the flavors and odors of some food. So, it should be tightly wrapped or covered when storing. Sweet butter sweet butter is there is a perishable it should be stored in refrigerator. Although it is tempting to store in a container in a cabinet at room temperature so that it is easy to spread. It will become rancid quickly due to the presence of milk solids that can spoil. So, when you stored in refrigerator, it should be tightly wrapped because it will absorb odors and flavors quite easily. Unsalted butter may be kept in a refrigerator for 2 to 3 weeks and salted butter may be kept some more longer like 4 to 5 weeks because the salt acts as a preservative. Butter freezes extremely well and may be kept in a freezer for at least half a year.

Summary

- Handling and storage of edible fats and oils are crucial aspects of maintaining their quality, flavor, and nutritional value.
- FOSFA plays a vital role in setting standards, promoting good trading practices, and providing arbitration and dispute resolution services for its members involved in the trade of oilseeds, oils, and fats.
- Shipping bulk oils and fats presents several challenges due to their unique characteristics and requirements.
- Proper storage of edible oils and fats is essential to preserve their quality, flavor, and nutritional value. Inadequate storage conditions can lead to the development of off-flavors, rancidity, and degradation of essential nutrients.

So, a handling and storage of edible fats and oils are crucial aspects for maintaining their quality, flavor and nutritional value. Phospholipids plays a vital role in settling standards, performing good trade practices and providing arbitration and dispute resolution services for its members involved in the trade of oil seeds, oils and fats. Shipping bulk oils and fats presents several challenges due to their unique characteristics and requirements. Proper storage of edible oils and fats is essential to prevent their quality, flavor and nutritional value. Inadequate storage conditions can lead to the development of off-flavor, rancidity and degradation of essential nutrients. So, this should be properly handled and stored well to maintain quality.

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These were the references. Thank you very much for your patience here. Thank you.