

REFINING OF OIL

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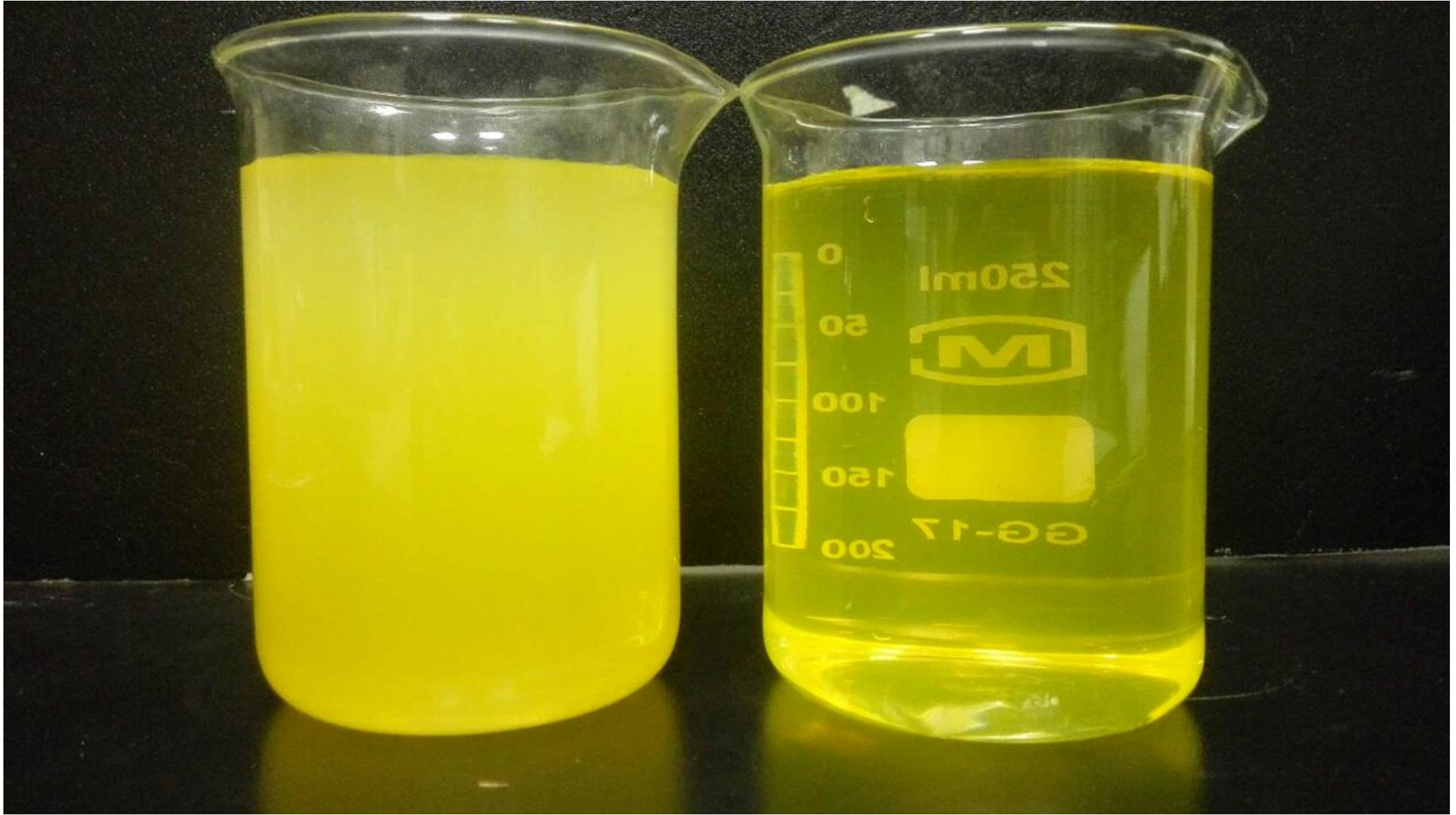
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METHODS OF OIL REFINING

- Degumming
- Neutralization
- Bleaching
- Filtration
- Deodorization

(DEGUMMING) Removal of Cloudiness

- Pressed oils need to be filtered to remove particles from the pressing operation, if the oil is to be clear and clean.
- If the cloudiness is caused by **gums** precipitating, the gums can be removed by **washing the oil with about 2 percent water**.
- For this process to be effective, the oil should be **heated**, and the **hot oil mixed with water**, with active stirring.
- Next the water and oil must be separated. For this, a **centrifuge** is most effective.
- The degummed oil should be **dried by heating** to drive off all moisture, for the reasons cited previously.
- Degumming can also be done by using **acid** and **enzymes**.



NEUTRALIZATION/DEACIDIFICATION

- It is a process of **removal of Free fatty acid(FFA)** other undesirable non- glyceride materials.
- These **non glyceride** materials are mainly:
 - Phospholipids (gums)
 - Oxidized products
 - Metal ions (e.g. iron, copper)
 - Color pigments (e.g. gossypol)
 - Insoluble impurities (e.g. meal fines)

Methods of neutralization

- **CHEMICAL REFINING**
- **PHYSICAL REFINING**

CHEMICAL REFINING

- The process is widely known as **caustic deacidification**.
- The main purpose of chemical refining is to **saponify** the FFA by an alkaline solution.
- The addition of an alkali solution to a crude oil brings about a number of reactions.
- These soaps are removed by separators either by static separation or centrifugal separation

Advantages of chemical refining

- Successful reduction of FFA up to the desired level.
- Can be used for reliably refining virtually all crude oils, including oils of low quality.
- Soaps formed during deacidification have the combined effects of purifying, degumming and partially decolouring the oils.

Disadvantages of Chemical refining:

- Considerable oil loss due to the hydrolysis of neutral oil by caustic in the form of occlusion in soap stock.
- Generates more waste which is difficult to treat.

PHYSICAL DEACIDIFICATION

- It uses steam stripping under vacuum, that removes FFA, unsaponifiable substances, and pungent compounds.
- Steam stripping can remove FFAs, most off-flavors, and pesticides, but the other impurities must be handled before the distillation step.
- To obtain good-quality fats and oils with physical refining, it is essential to have a **phosphorus content lower than 5 ppm** before steam stripping.

Advantages of physical refining:

- Oil losses are reduced,
- The quality of FFA is improved.
- The operation is simplified.
- It consumes less steam, water and power.
- Improved product yield.

Disadvantages of physical refining:

- Certain oils contain impurities that cannot be adequately removed by the pretreatment process to enable them to be physically refined.
- It has been reported that physical deacidification reduces the tocopherol(vitamin E compounds) content and destroys all carotenes present in palm oil.
- It requires high temperature and high vacuum, and often forms side reaction products.

(BLEACHING) REMOVAL OF EXCESS COLOR

- For the removal of excess color, **bleaching earths** are effective.
- The oil is heated and mixed with **1-2 percent** of its weight of an effective **bleaching earth**.
- After a contact time of approximately **one hour**, the bleaching earth is **separated by filtration**.
- **Activated carbon** can also be used.

FILTRATION(ASSIGNMENTS)

- Vertical pressure leaf filter
- **Bag filter**
- Horizontal pressure leaf filters
- Safety filters
- Cartridge filters

DEODORIZATION (Removal of Unwanted Flavors)

- Unwanted flavors are more difficult to remove.
- They may be due to excessive free fatty acids. (Acidity of over 10 percent is common; if over 20 percent acid, the oil is good only for making soap.)
- Free fatty acids can be removed from the oil by washing the oil with alkali.
- The fatty acid will react with the soda to form soap, which stays in the water phase.
- It is let to stay for several hours and siphon off the oil layer.
- If the oil still contains fatty acids, you should repeat the operation.

- Other types of flavors than those of fatty acids can be removed from oil, but an expensive and difficult process known as **deodorization** is used.
- It involves **distilling off the unwanted flavors under high heat and high vacuum**.
- Normally the oils being processed by small-scale pressing would have the flavors of the raw material from which they came, and there would be no need for deodorization

NOTE

- These conventional deacidification methods are not best suited for oils that contain more than 8–10% FFA.
- The basic unit operations in vegetable oil processing have remained relatively unchanged for the past 5–6 decades.