Contribution to the neutralization of olive oil

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CONTRIBUTO ALLA NEUTRALIZZAZIONE DELL'OLIO D'OLIVA

Il lavoro descrive una modifica al metodo di raffinazione all'alcali con il dry process. Il metodo si basa sull'evaporazione dell'eccesso di acqua contenuta nelle paste di saponificazione, effettuata nel recipiente di neutralizzazione. Questo trattamento riduce notevolmente le perdite di neutralizzazione come pure i costi di apparecchiature e di esercizio e dà luogo a paste di saponificazione solide e facili da trattare.

The article describes a modification of the conventional alkali refining with the Dry process. It is based on the evaporation of the excess of water contained in the soapstock which is carried out in the neutralization kettle.
This treatment reduces seriously the neutralization losses as well as the equipment and the operating costs and gives a soapstock in solid state easy to handle.

In the present article a modification of the conventional batch neutralization process of olive oil is described. The purpose of this modification is to reduce the neutralization losses and to obtain a soapstock in a form easy to handle and to transport.

The method has been applied in the refining of industrial crude olive oils obtained either by pressing or by centrifugation,which have an acidity higher than 3% expressed as oleic acid. Oils obtained by solvent extraction for the olive pomaces (1) may have a higher acidity if these residues have undergone a fermentation.

In recent years these residues are treated before their fermentation and the acidity of the solvent extracted olive oils, the so called olive oil foots (2), does not exceed the 10% and can also be refined by the usual batch processes. The whole treatment of degumming and neutralization can be carried out in the conventional open neutralization kettle with a paddle type agitator, a heating coil or steam jacket and a steam jacketed conical bottom.

The first step is the degumming which can be carried out according to the methods described in the literature (3). Olive oil belongs to the oils with a minor content of gums. Some laboratory tests can help for the selection of the most appropriate. A very effective method is the treatment with spent bleaching earths in the bleaching kettle.

The neutralization is carried out by the conventional "dry method" (4). It is advisable to utilize a concentrated caustic soda solution in order to facilitate the following evaporation of the excess of water from the soapstock.

The charge is left overnight to obtain a good separation of the soapstock. The next morning the separated neutral oil is drawn out with the swinging pipe and sent to the neutral oil tank or to the bleaching kettle. Usually olive oils neutralized by the dry method do not need to be washed. Eventual traces of soaps are eliminated in the bleaching process.

The soapstock remaining in the bottom is rapidly agitated and steam is opened in steam jacket. The soapstock begins to boil and care should be taken to prevent an excessive foaming.

During the evaporation, which takes about two hours, the soapstock rejects a great part of oil. This oil has an acidity of about 2% and is drawn with the swinging pipe and sent back to the crude oil to be refined. At the end of the evaporation the temperature of charge goes up to 105°C. A thermometer on the conical bottom is helpful.

The evaporated soapstock is drawn warm from the bottom valve and collected in shallow pens to be cooled. In ambient temperature the soapstock becomes solid and can be cut in pieces and packed in plastic sacks. It should be reminded that olive oil gives a hard soap while other vegetable oils containing more unsaturated acids, give soft soaps.

Usually the soapstock obtained from the neutralization of olive oil by the Dry Method contains 40-45% of water and about 55% of fatty materials consisting of saponified fatty acids and of neutral oil. The neutralization losses represent about 1.6 times the amount of free acids contained in the crude oil. The evaporated soapstock will contain 15% of water and 82% of fatty materials and the neutralization losses will fall to about 1.2 (*).

The above numbers represent results obtained in the plant from a series of comparative tests by controlling the weights of crude oil and of neutral oil and by taking in account the non oil contents of the oil.

As says Bernardini (6) "in actual fact the best method for determining the neutralization losses is to control the weight of the neutral oil".

The evaporation makes the production of acidulated soapstock unnecessary since the soapstock serves for the manufacture of soaps.

The evaporated soapstock corresponds to about 70% of the initial soapstock and does not ferment when kept for a long time.

The described process is simple and can be carried out in the equipment existing in every oil refinery operating in batches. Its advantages are the lower neutralization losses, the production of smaller quantities of soapstock in solid state and easy to handle and transport and avoids the sulfuric acid treatment, the acidulation, which is very troublesome.

In comparison with other neutralization processes (continuous alkali refining, steam refining, solvent refining, etc.) the described process does not require any special expensive equipment and reduces seriously the consumption of steam, electricity and manpower as well as the equipment costs.

The process could be applied in the neutralization of other vegetable oils containing more unsaturated acids than olive oil, but the evaporated soapstock will be soft.

(*) Olive oil costs much more than any other edible oil, consequently reducing the operating losses to a minimum is of great interest.

REFERENCES

1) «Bailey's Industrial Oil and Fat Products - 4th edition, 1982, vol. II, page 193.
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3) «Bailey's Industrial Oil and Fat Products - 4th edition, 1982, vol. II, page 255.
4) «Bailey's Industrial Oil and Fat Products - 4th edition, 1982, vol. II, page 273.
5) «Bailey's Industrial Oil and Fat Products - 4th edition, 1982, vol. I, page 372.
6) E. BERNARDINI, «Oil and Fat Technology», II edition, Rome 1973, page 445.