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我们将始终坚持一贯的质量第一原则，通过与最终用户和过滤设备厂家的紧密技术合作、良好的服务创造共赢效果，为中国过滤事业踏实的做出自己的贡献！

Oil Production

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Process Summary:

Oil extraction:

The first stage in palm oil production is the extraction of oil from the pulp of the fruit, which after initial sterilisation, is achieved with a screw press or expeller. The crude palm oil is then centrifuged to remove water and transferred to the refinery, often in a location where other oils are also processed. In a separate operation, the palm nuts that remain after pressing are also processed in a cracking machine to expose the palm kernel, which in turn is crushed to produce crude palm kernel oil (different characteristics to palm oil). This is filtered and also forwarded to a refining plant.

Refining:

Although the reddish looking crude palm oil is consumed in some countries in this form, in most cases further 'refining' is required – in particular to remove free fatty acids, colour, and odour. The refining operation usually falls into either a physical or chemical type, the difference between the two being basically the type of chemicals used and the manner in which the free fatty acids are removed. The former employs operations such as degumming, bleaching and deodorisation and the latter degumming, neutralisation, washing, bleaching and deodorisation.

Degumming is essentially to remove phosphatides (gums) and other impurities and although there are several methods by which this is achieved, a classical route is that of adding weak (e.g. 0.04%) phosphoric acid and hot water. In the chemical process the next stage is neutralisation, essentially to remove free fatty acids, and is usually carried out by adding caustic soda. This combines with fatty acids to produce soap, which is subsequently separated by decantation/centrifuge and forwarded to a soap making facility. Final traces of alkali are removed from the oil by mixing with hot water, settling and separation. In the physical process the need for the addition of caustic is obviated. In both processes the oil is forwarded to a bleaching operation where bleaching earth is added to adsorb unwanted pigments, trace metals and oxidation products. The spent bleaching earth, + adsorbed impurities from degumming, is subsequently separated by filtration. The oil then passes through heat exchangers to a deodorising process, a high temperature (~240°C) vacuum steam distillation operation that removes the agents responsible for the odours and undesirable flavours. The refined oil is again filtered, cooled and forwarded to storage or further modification.

Oil Modifications:

In vegetable oil production in general, several processes may be encountered e.g. winterising – chilling the oil to remove saturated glycerides or waxes, which at low temperatures (e.g. when refrigerated) would make it appear cloudy, hydrogenation – converting the oil into a solid fat and the more recent interesterification – modifying the oil to obviate the presence of trans-fats, which are said to be deleterious to health and occur following conventional hydrogenation.

That said, as in most cases hydrogenation is not necessary in palm oil production, the most widely used modification

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process is that of fractionation, which splits the oil into two fractions; a “more liquid” (olein) fraction for use in cooking oils and a “harder” (stearin) fraction for the production of margarine or shortening. The most environmentally friendly approach here is that of ‘dry fractionation’ (as opposed to wet solvent fractionation), which as in winterising first raises the temperature of the oil to destroy any crystals followed by chilling and separation of the two fractions by filtration.

Filtration Stages:

During oil extraction, prior to entering the refining plant, the crude palm kernel oil may be clarified by filtration either by filter press or pressure leaf depending on capacity/local preference.

In the refining process itself, the first stage where filtration is encountered is likely to be at the bleaching stage i.e. in the removal of bleaching earth. Pressure leaf filters (horizontal and vertical) pre-coated with filter aid are frequently found here - often supplied with filter elements that do not require textile filter media! Security filters, again of pressure leaf design are also engaged. Filter presses may also be found, possibly using filter papers on top of the filter cloth to ensure maximum capture of bleaching earth. If steam blowing were carried out to maximise oil retention, due cognisance must be taken of the potential hydrolytic affect that this will have on the filter cloth.

Both winterising and fractionation employ similar filtration technologies, employing a wide range of filter types e.g. pressure leaf filters, RV drum filters, filter presses (membrane + plate & frame) and even vacuum belt filters have been reported. In the case of filter presses – arguably the preferred technology - the working environment is such that there is a distinct risk of electrostatic discharge, which could result in serious equipment damage. Filter plate membranes and filter media incorporating conductive components - properly earthed - may therefore be the order of the day.

[Where hydrogenation is employed, mainly in other vegetable oil applications, a finely milled catalyst, as used in the process, has to be removed. Once again depending on local choice, filter presses and pressure leaf filters are used in this removal stage. As conditions are quite hot (~ 100°C), due note should be taken when selecting the filter media]