

Unilever best proven practices on dewaxing and winterisation

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Dewaxing and winterisation are fractionation processes whereby a relative low concentration of high melting fatty material is crystallised and separated from a liquid oil. The separated high melting fatty material can be saturated triacylglycerols (this process is normally called winterisation) or waxes, esters of long chain fatty acids and long chain primary alcohols mainly present in sunflower and corn oil (this process is called dewaxing). The low concentration of crystallised material in dewaxing/winterisation compared to fractionation of e.g. palm oil leads to the following differences:

- The low value of the crystallised fatty material compared to the total product value (waxes from dewaxing have a value well below that of oil, the solid fraction from winterisation can be used in shortening or margarine hardstocks).
- After crystallisation a less viscous slurry is obtained (more easy to pump and filter).
- In dewaxing, the use of “classical” filter types mostly in combination with filter aid instead of membrane presses (also other separation methods like centrifuges are used).

Based on earlier research and pilot factory trials, Unilever established in 1992 the following process recommendations for dewaxing of sunflower and corn oil:

1. The feedstocks for dewaxing should be neutralised and bleached or super-degummed and two-step bleached to limit the levels of phosphatides and soap.
2. Before crystallisation the oil should be at a temperature of around 50°C. The oil should be cooled at a cooling rate below 15°C/h to a final temperature below 10°C. In this way large and easy to filter crystals will be formed.
3. For homogeneous crystallisation conditions, the difference between bulk oil temperature and average cooling medium temperature has to be below 15°C, the slurry should be slowly stirred.
4. When filter aid is used, the optimal filter aid : wax ratio is around 10 : 1.
5. For filtration, a vertical leaf filter with a horizontal tank (shell) is recommended.

Feedstocks for winterisation are liquid oils with relative high levels of (partly) saturated triacylglycerols like cottonseed oil and partly hydrogenated oils (high in trans fatty acids). Also in winterisation the cooling rate, crystallisation temperature and agitation are determining the crystal size and, hence, the filtration properties of the slurry.

Besides the “classical” crystallisation – filtration process with filter aid there are several alternative dewaxing or pre-dewaxing processes which may be applicable under special circumstances. These processes include:

- Dewaxing combined with neutralisation in a batch neutralisation vessel.
- Combined centrifugal neutralisation and (pre-)dewaxing.
- Combined super-degumming and pre-dewaxing.
- Filtration without filter aid over a cloth filter, after filtration the wax is recovered by heating the filter and draining.

Separation of the wax by microfiltration. The wax layer is periodically removed by back blowing with nitrogen and after a number of these cycles by backflushing with hot oil.