

REFINING AND PROCESSING OF FATS

Fats and oils commonly used in food preparation are separated from various materials and refined. Many oils come from seeds or fruits, lard comes from pork tissue and butter comes from cream. Further processing produces fats such as margarine and hydrogenated shortening.

Refined Oils

Vegetable oils are removed from oil-containing seed fruits or nuts by various pressing processes, by solvent extraction and by combination of these. A seed cake that is relatively high in protein remains after fat extraction and is often used for animal feed.

The steps involved in refining oil is given in Figure 10-a.

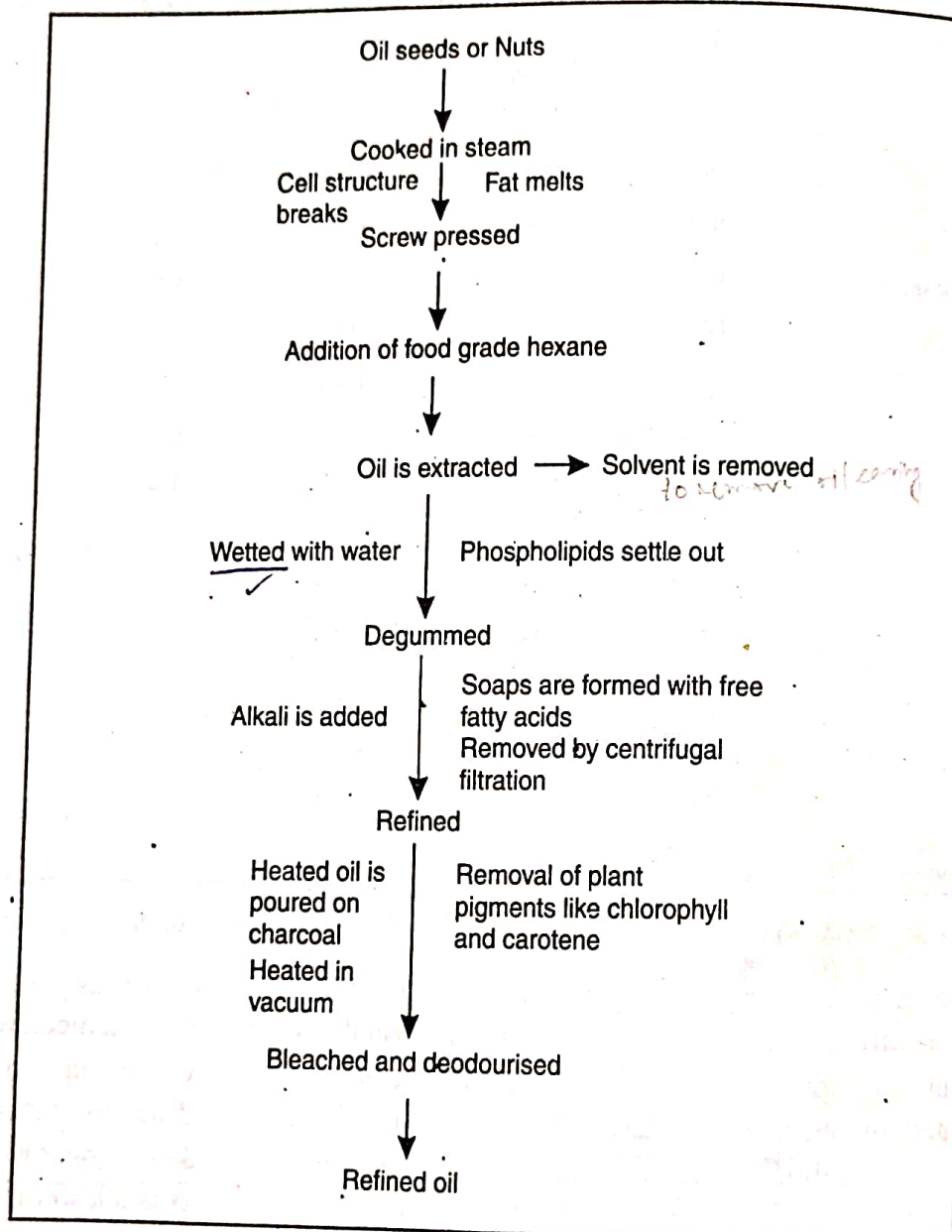


Figure 10-a: Steps involved in making refined oil.

Many vegetable oils do not lend themselves to conventional refining techniques. Rice bran oil ends up with a refining loss factor of nearly 4 as against 2 for normal oils. A lot of solvent extracted mustard oil, rape seed oil, groundnut oil end up at FFA above 10 per cent. Such oils cannot be refined by alkali treatment. It is only by distillative deacidification that they could be refined and used as cooking oils.

After extraction, the crude oils are refined. The first step is usually to react the oil with an alkaline material to remove the free fatty acids that are not attached to a glycerol molecule. Free fatty acids in excess can detract from the oil's flavour and decrease its effectiveness when used for frying. The unwanted products of this reaction are then removed by centrifuging and washing, with a final drying

process. This is followed by bleaching and deodourising to remove colour pigments and further purify the oil.

Plasticity

Most fats that appear to be solid at room temperature actually contain both solid fat crystals and liquid oil. The liquid part is held in a network of small crystals. Because of this unique combination of liquid and solid, the fat can be moulded or pressed into various shapes without breaking. This property of fat is called plasticity. The type and size of the crystals in a plastic fat influence the performance of the fat in baked products and pastry. Plastic fats can be creamed that is, mixed with the incorporation of air.

Hydrogenation

By hydrogenating vegetable oils, it is possible to simulate a widely acceptable product like ghee. (The process of hydrogenation changes liquid oils into more solid plastic shortenings and to increase the stability of the oils to prevent spoilage from oxidation.) Oxidation of oil results in undesirable rancid flavour and odours.

(Hydrogenation takes place in a reactor, where hydrogen gas is bubbled through the liquid in the presence of a nickel catalyst, which speeds up the reaction. In the process of hydrogenation some of the double bonds between carbon atoms of the fatty acid portion of the triglyceride molecule are broken and hydrogen is added. There is a decrease in the number of double bonds, an increase in the proportion of trans double bonds and a randomisation of double-bond positions along the chain. This chemical change makes the fatty acids more saturated. The melting point of the fat is thereby increased. With sufficient hydrogenation it becomes solid at room temperature.) Careful control of temperature and pressure in the hydrogenation process allows to achieve the desired end result, that is, the proper degree of plasticity. The fat can then be creamed and blended with other ingredients. Hydrogenated fat is suitable for making cakes and biscuits.

Soyabean oil, cotton seed and palm oil are used for hydrogenation. Hydrogenation greatly improves the stability of soyabean oil and therefore its resistance to the development of undesirable flavours. Examples for hydrogenated fat are margarine, vanaspati, salad dressings and shortenings.

Indian vanaspati is prepared by partial hydrogenation of vegetable oils. It contains > 20% transfatty acids and > 60% saturated fatty acids. (NIN-2000).

Hydrogenation changes the nutritional properties of fat. Polyunsaturated fatty acids not only become more saturated but the essential linoleic acid and possibly other unsaturated fatty acids lose biological activity when they are converted to the transform.

Winterisation

Some cooking oils become cloudy when they are stored in the refrigerator. This occurs because some of the triglyceride molecules in the oil have higher melting points than other molecules in the mixture and crystallise or become solid at the low temperature.

In manufacturing oils intended to be used primarily for the making of salad dressings, a winterising process is applied. In this process, the temperature of the oil is lowered to a point at which the higher-melting triglycerides crystallise. Then the oil is filtered to remove these crystals. The precooling treatment to remove fat crystals is known as winterising. The remaining oil has a lower melting point and does not crystallise at refrigerator temperatures. It is referred to as salad oil. In Europe, colza, refined rape seed oil, is used as salad oil.

Shortening fat

? Fat has a shortening power, that is, it interlaces between protein and starch structures and makes them tear apart easily. It makes the protein strands short rather than allow them to stretch long. Thus, they tenderise baked foods by preventing the cohesion of wheat gluten strands and are used in making biscuits, cakes, doughnuts, pastries and breads. The different layers developed in puffs, and in (khari) biscuits is due to the addition of fat which acts as shortening agent. The fat added to maida dough results in soft roti due to shortening property of fat.

deep fried
dough

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