



Technical Paper

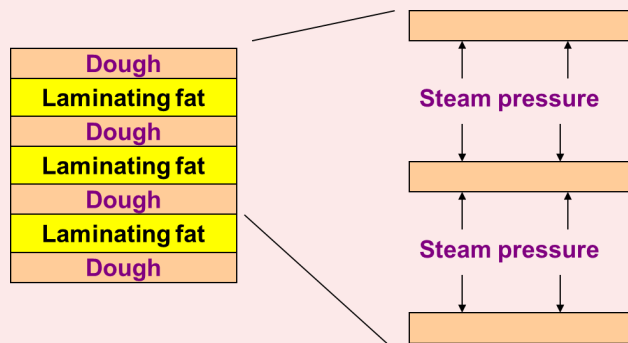
No. 11

**FATS & OILS
IN THE MANUFACTURE
OF
BAKED PRODUCTS**

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FATS & OILS IN THE MANUFACTURE OF BAKED PRODUCTS

Fats and oils have a long history of being used in the manufacture of bakery products with their basic roles have been to modify texture and add flavour. The impact of fat on product eating is recognised in the historical use of the term 'shortening' which indicates that the inclusion of fat 'shortens' the product texture. Fats and oils also make important contributions in the formation of bakery product structures, in part by the manner in which they are incorporated along with the other recipe ingredients.



A good example of how the incorporation of fat affects product structure is the contrast between the manufacture of short pastry, where the fat is blended with the other ingredients during mixing, and puff pastry, where the fat is not directly added to the dough but is used to create alternate layers of fat and dough during processing which play a key part in product lift in the oven.

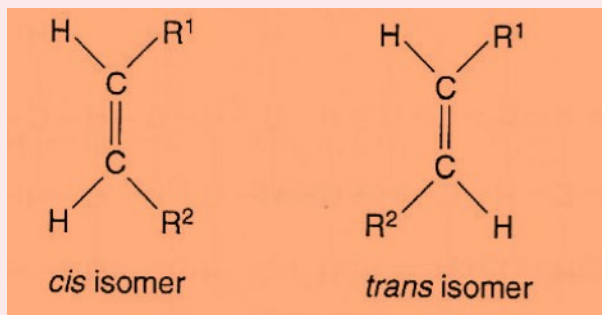
Fats and oils occur naturally in plants, animals, and fish. In the baking industry today, most of the fats and oils that are used come from plant sources. The terms 'fat' and 'oil' may be used interchangeably in many circumstances which can create some confusion. The chemistry of oils varies according to their source but the physical form in which they exist depends on the temperature at which they are held. Fats which appear to be solid at say room temperature, readily turn to an oil when the temperature is raised and likewise if the temperature of an oil is lowered, it readily turns to a solid. This impact of temperature not only changes the appearance of the oil but also affects its functionality in baking.

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Types of Fats and Oils and their Characteristics

In scientific terms, fat and oils are classed as 'lipids' (and sometimes as 'glycerides'). Their basic chemistry and physical form of fat and oils derive from the combination of naturally occurring glycerol with up to 3 'fatty acids'. The fatty acids get their name because they act as weak acids in chemical reactions. There are a number of different fatty acids and some of them are only found in one source (i.e., animal, fish or plant). They may exist as 'free fatty acids' but are commonly encountered in combination with glycerol (a trihydric alcohol). The combination of glycerol and fatty acids occurs naturally and their presence in a fat/oil has a major impact on the behaviour of the compounds which are formed; tri-(3), di-(2) and mono-(1) glyceride forms all occur.

Most fatty acids have a linear or chain form and contain an even number of carbon atoms in their structure. If the links between the carbon atoms comprise single bonds, then the fatty acids chains are said to be 'saturated'. If, however, double bonds occur between carbon atoms, then the fatty acids are described as 'monounsaturated' for 1 double bond between carbon atoms and 'polyunsaturated' if there are 2 or more. To add to the complexity the positioning of the carbon double bonds can lead to more than one fatty acid form; namely *cis* and *trans* which refers to the position of hydrogen atoms in the fatty acid structure.



***Cis* and *trans* forms of fatty acids**

[The symbols C and H are for carbon and hydrogen atoms respectively; R₁ and R₂ represent more complex molecules]

Natural fats are a mixture of triglycerides, or put another way, a natural fat is a mixture of lipid fractions some of which will be solid and others liquid at a given temperature. Butter is a mixture of lipid fractions and provides a useful for understanding the role of fats in baking. While relatively firm at room temperature, it turns hard when the held under refrigeration and melts in left in a warm. If it is all liquid it loses much of its functionality in cake making and would be impossible to handle in the manufacture of laminated products. Equally if all solid it is difficult to process in the manufacture of many bakery products. These differences illustrate the key role of the liquid component (the oil) in delivering and aiding the dispersal of the solid component (the fat) with specific functionality in many bakery products. Equally it is because butter is a mixture of oils and solid fat that we are able to readily spread it on bread.