

of cost the dosage is often reduced to as little as 150 g.

18.6.5 Sodium and Calcium Stearoyllactylate (SSL and CSL)

These emulsifiers are made from the fatty acid stearic acid esterified with a double ester of lactic acid. The remarks concerning DATEM also apply to these, but with the difference that SSL and CSL are especially suitable for baked goods with a soft crust. Furthermore, they have a better effect on the retention of crumb softness.

18.6.6 Other Emulsifiers

Tab. 92 summarizes the emulsifiers suggested for baking. Sucrose esters seem to be interesting since they are produced in a wide range of HLB (hydrophilic or lipophilic). The high-HLB variants, especially, have a good effect on volume yield and crumb structure at quite low dosages, but the price is still much higher than that of conventional baking emulsifiers.

18.7 Acidulants and Acidity Regulators

Sprouting in rye and wheat results in a high level of amylase activity in the grain itself with the usual effects on baking properties. It is generally known that even flours with very low Falling Numbers can produce good baking results if well acidified.

However, not every bread consumer likes acidity and bakeries may also have less and less time and personnel available to develop acidity by sour dough fermentation. Other ways are available, and these consist in adding fruit acids, the salts of these and also carbonates and phosphates approved for use in foods. It is then possible to adjust the pH of the dough slightly so that it moves out of the range in which the enzymes of the grain have their strongest effect.

Moreover, these substances influence the swelling of the flour constituents and the pro-

Tab. 92: Suggested emulsifiers with potential use in baking applications

Emulsifier	Common abbreviation	HLB	Application and benefit
Acetyl esters of monoglycerides	AMG	2.5-3.5	Whipped cakes, volume
Calcium stearoyl lactate	CSL	7-9	Bread, shelf-life, volume
Diacetyl tartaric esters of monoglycerides	DATEM	9.2	Bread, shelf-life, volume
Ethoxylated mono- and diglycerides (polyglycerates)	EMG	12-13	High-fibre bread; shelf-life (combined with monoglycerides)
Glycerol monostearate (non self-emulsifying)	GMS	3.7	Shelf-life
Glycerol monostearate (self-emulsifying)	GMS	5.5	Shelf-life
Lecithin	LC	3-4	Shelf-life, dough properties
Lactyl esters of monoglycerides	LMG	3-4	Whipped cakes, volume
Mono- and diglycerides	MDG	2.8-3.8	Bread, cakes, cookies, volume
Polyglycerol ester	PGE	12-13	Whipped cakes, volume
Propylene glycol monostearate	PGMS	1.8	Whipped cakes, co-emulsifier
Polysorbate 60	PS 60	14.4	Whipped cakes, co-emulsifier
Succinyl monoglyceride	SMG	5-7	Yeast leavened baked goods; volume
Sorbitane monostearate (e.g. SPAN 60)	SMS	4.7-5.9	Whipped cakes, volume
Sodium stearoyl lactate	SSL	18-21	Bread, shelf-life, volume
Sucrose esters	SUE	7-13	Bread, cake, volume

tein structure, and this helps to counteract the negative effects of excessive enzyme activity (e.g. water release). The most suitable preparations are those that stabilize the pH at the level to which it has been adjusted, i.e. so-called buffer substances, mixtures of different salts or acids. In most cases the dosage is in the range of about 50 to 200 g to 100 kg of flour. Fig. 136 shows the effect of an alkaline buffer agent on the Falling Number and on the volume yield.

Nevertheless, with the inorganic phosphates and carbonates care has to be taken not to exceed the limits of the flour grades, as these substances pass into the ash. With sprouted grain it is in any case advisable, whatever the treatment, to use a smaller proportion of the enzyme-rich outer layers of the grain (reduce the yield) and produce lighter-coloured flours that then tolerate the addition of flour improvers containing ash.

18.8 Bleaching Agents

Although there is an awareness of the importance of roughage, minerals and vitamins there is still a demand for a very light-coloured crumb in many wheat products. This is

true of numerous products ranging from Arabian-style flat bread and baguettes to sliced bread for toast. The flavonoids responsible for the colour can be bleached with oxidizing agents.

18.8.1 Benzoyl Peroxide

For a long time, benzoyl peroxide was a familiar oxidative bleaching agent and it is still used to this day in many countries. In addition to its good bleaching effect it has a slight influence on the structure of the gluten, but this is not apparent when other flour improvers such as AA are used.

The dosage for benzoyl peroxide is about 5 - 10 g to 100 kg of flour (50 - 100 ppm) into the flour stream. It is usually sold as a 27 - 32% product (to enable safe transportation it is diluted with an inert carrier), and the dose is then correspondingly higher. The effect of benzoyl peroxide on the flour is already visible after 6 hours of storage and complete after 24 to 72 hours. Benzoyl peroxide decomposes to benzoic acid (Fig. 132), a substance found in various fruits and berries and used as a food preservative, e.g. in cream and fruit fillings for pastry at dosages of 0.05 - 0.15% (500 - 1,500 ppm).

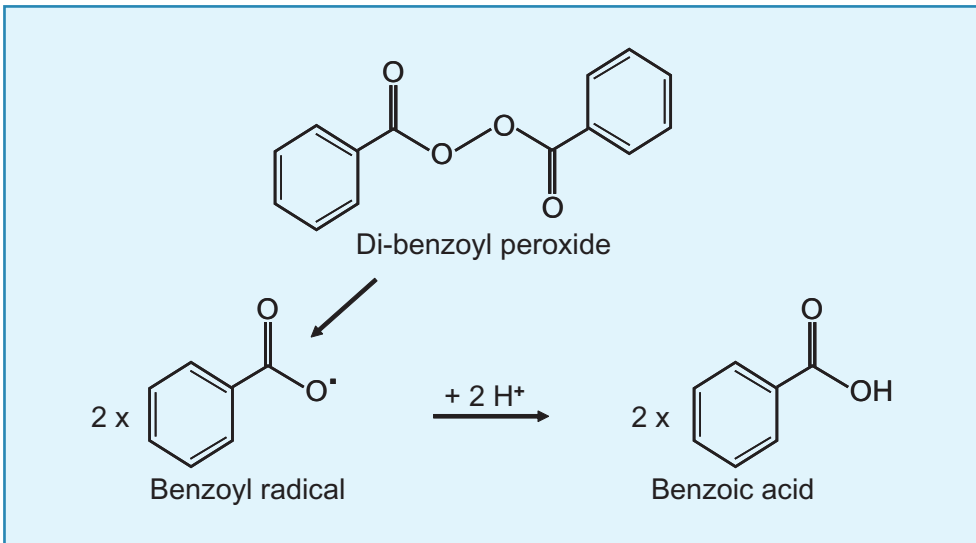


Fig. 132: Decomposition of benzoyl peroxide