

# PALM-BASED COCOA BUTTER SUBSTITUTES (CBS)

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cocoa butter substitutes (CBS) are fats which are designed to match the physical properties of cocoa butter and palm and palm kernel oils have long been the most important sources of oils for their manufacture. There are many different CBS fats suitable for a wide variety of confectionery applications, but they can be divided neatly into two types: Lauric and Nonlauric.

## LAURIC CBS

Lauric type cocoa butter substitutes are predominantly composed of saturated triglycerides of lauric (C12) and myristic (C14) acids derived from the two major lauric oils in nature, palm kernel oil and coconut oil, although for this application at least, palm kernel oil is much more important and versatile.



Lauric oils can be fractionated, hydrogenated, interesterified and blended. These methods can be used on their own or in conjunction with one another to give a wide range of solid fat contents and melting points.

Fractionation of the oil can be carried out by dry, detergent or solvent processes to give a stearin with similar physical properties to cocoa butter. The stearin, with or without hydrogenation is an excellent CBS which is particularly suitable for the manufacture of solid or hollow-molded product; such fats have very high solid fat contents, and give molded products possessing good snap and good resistance to fat bloom combined with good melting properties. Substitute chocolate prepared from lauric fats forms stable crystals on rapid cooling without the need for tempering. Freedom from need to temper, greatly



simplifies the plant required for confectionery production and thereby reduces costs.

Hydrogenated palm kernel oil (HPKO) can be interesterified and blended with palm oil products to modify the melting profile and solid fat content curve and make the fat more suitable for certain applications. Coatings made from them have moderate resistance to fat bloom and their gloss is inferior to those based on PK stearin.

Unhydrogenated palm kernel oil (PKO) is a good chocolate coating fat for ice-cream and deep-frozen confections because the coatings formed are hard, yet elastic and not brittle. Due to its appropriate solid fat content curve, the coating sets quickly when it is applied on to the ice-cream.

When CBS is used in substitute chocolate or other coating formulations, the coating must be formulated with low-fat cocoa powder in order to avoid its basic in-compatibility with cocoa butter. The use of lauric CBS fats requires good manufacturing practices because they are sensitive to hydrolysis.

This can lead to a very unpleasant soapy taste as the fats are attacked and split by enzymes in the presence of moisture.

Hydrogenated palm kernel oil and hydrogenated palm kernel olein (HPKOo) are highly suitable for tof-

fee formulations. The inclusion of these fats improves the texture by giving body to the product and providing chewiness, lubrication and resistance to moisture penetration.

Hydrogenated palm kernel olein makes low cost CBS fats suitable for a range of applications. It is especially useful for bakery coatings and glazes for cakes, for centers in chocolates and for biscuit creams and wafer fillings.

## NON-LAURIC CBS

Nonlauric cocoa butter substitutes are usually made from oils which are liquid at ambient temperatures, and which therefore, have to be hydrogenated in order to bring their consistency to the appropriate level. Most frequently they are further adjusted by fractionation and blending. Sources of suitable nonlauric fats include soyabean, cottonseed, palm, groundnut (peanut) oils. Nonlauric cocoa butter substitutes can be divided into two types: hydrogenated nonlauric CBS and hydrogenated fractionated nonlauric CBS.

These products have good uses in compound coatings for biscuits and chocolate flavoured baking chips. However their use is limited by their

rather poor eating quality viz poor flavour release and mouth-feel. Nevertheless such coatings have good gloss and often have high resistance to fat bloom with consequent long shelf life. The most attractive positive aspect of the simple hydrogenated nonlauric CBS is their low cost compared to other types of hard butter. In coating application where prices considerations are more important than eating quality, this type of CBS is a good proposition.

Nonlauric CBS can be significantly improved by fractionation. An example of fractionated non-lauric CBS is hydrogenated and fractionated palm oil. This fat has higher solid fat content at ambient temperatures and narrower melting range than the simpler nonfractionated types. Fractionated nonlauric CBS can tolerate up to 25 percent cocoa butter on a fat basis when used in confectionery coatings, whereas lauric CBS may contain no more than about six percent cocoa butter. Compound coatings formulated with nonlauric CBS are used almost entirely for enrobed products.

Summarising, nonlauric CBS do not need tempering, are more compatible with cocoa butter and when partly melted, more readily reset to the original gloss. However, they taste more gummy or waxy than the lauric CBS and because of their much lower contraction on cooling they are not suitable for the production of moulded chocolate-type products.

PORIM Technical Advisory Unit and Food Technology Unit are actively involved in assisting customers in formulation and advisory work on CBS and other specialty fat products. Queries on sources of supply, and utilization of CBS can be directed to:

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