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**Bakery & Confectionery  
Applications of Fats & Shortenings**

**AAK KAMANI**

# Application of oils & fats

- ◆ Oils and fats are an essential ingredient to the process of food preparation
- ◆ Provide nutrition(energy), eating pleasure and satiety
- ◆ Improve the texture/ crispiness of the finished product
- ◆ Improve shelf life of finished foods
- ◆ Enhance visual appeal

*Frying/cooking, baking, chocolates & confectionery production, Margarines & spreads, mayonnaise & salad dressings, ice-cream/ frozen dessert, non-dairy whipping cream, imitation cheese etc*

# Functional role of oils & fats in biscuit and baked products



## ◆ Functionality of Bakery Fats:

- Prevents the aggregation of flour gluten
- Imparts Lubricity, Tenderness and richness
- Enhances air entrapment in dough mixing
- Holds gas bubbles for cellular texture
- Smooth consistency facilitates proper mixing
- Extends shelf life of product and promotes flavour
- Enables formation of flakiness and crust
- Heat transfer

# Bakery fats/shortenings

Important factors for satisfactory performance of a bakery fat are

- ◆ Optimum plasticity range and tolerance to high temperature
- ◆ The crystal habit and plasticity of shortening-crystallised in particular crystal structure to get improved creaming properties, texture and consistency
- ◆ Shortenings having the right plasticity has good spreadability in dough, good heat resistance and creaming properties.



## Bakery Fats ....contd

The flavour and oxidative stability of shortening –

- ◆ Completely bland flavour so that it enhances flavour of the food product rather than contribute a flavour
- ◆ The bland flavour must be stable throughout the life of product and hence its oxidative stability is important
- ◆ Oxidation rate is directly related to type and amount of unsaturated fatty acids present
- ◆ Reduction of unsaturated fatty acids is achieved by hydrogenation, fractionation or both.

# Application of Bakery fats/shortenings

Shortenings are used in -

- Doughs
- Cream filling
- Surface sprays

# Shortening used in Dough

- ◆ The shortening used must have good plasticity and SFC high enough at dough temperatures so that it can be smeared through the dough( to achieve cohesiveness but lacking in elasticity) but low enough at body temperature to avoid a waxy mouth feel when eaten.
- ◆ Must have good oxidative stability (Rancimat - 40 hrs)
- ◆ Oils with high PUFA content are avoided

## Shortening used in cream fillings

- ◆ Comprises of about 1/3 shortening and 2/3 finely ground sugar with suitable flavour
- ◆ Must be firm at ambient temperature so as to bind the two shells together and should not come out of the sandwich
- ◆ Must give a firm bite to consumer but simultaneously melt quickly to give cooling sensation on the palate and better release of flavour
- ◆ Must set rapidly after spreading so that two shells get hold together during transport and packaging
- ◆ The shortening used in this application must have low solids content at body temp. and yet have high solids between 15 C and 25C so that shells remain joint
- ◆ Lauric fats like CNO/PKO based shortening is ideal.



# Snack spray fats

- ◆ Fats sprayed on the surface of cracker biscuits to give them attractive glossy surface and improve their eating quality
- ◆ It also enables added salt to adhere to the surface
- ◆ The fat must have good oxidative stability because it covers large food surface area as a thin film
- ◆ It must have low melting point so that it is liquid at R.T. to avoid greasy or waxy mouth feel and dull surface appearance
- ◆ Blends containing Lauric fats are favoured in this application.

# New Trends

## ◆ Incorporation of ingredients that provide health benefits

Shortenings/margarines fortified with

### ➤ Omega-3 fatty acids (EFAs).

Flaxseed oil is the richest plant source of omega-3 fatty acids(50-54% ALA)

### ➤ Plant sterols which are known to have cholesterol lowering effects

### ➤ Vitamins (A,D,E) and minerals like calcium

## ◆ Incorporation of ingredients that address health concerns

### ➤ Low sodium, high calcium

### ➤ High dietary fibre

### ➤ Low sugar/ Sugar free

# New Trends

- ◆ Pumpable shortenings - Most bakeries go for pumpable shortening as alternative for traditionally used bag-in-box plastic shortenings

## Advantages:

- more flexibility for oil selection
- capable for reformulations: e.g. low trans shortenings
- reduce costs: work force, raw materials, handling
- easy to incorporate into product mix

- ◆ Trans free Fats

- ◆ High Mufa, Low sat fats
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# **SPECIALITY FATS FOR CHOCOLATES & CONFECTIONERY**



# Desirable Properties of Chocolate Fats

Traditionally, natural cocoa butter was the only fat that possessed the most desirable properties for making chocolate, namely :

- ◆ optimum fluidity and viscosity
- ◆ excellent cooling characteristics
- ◆ excellent gloss
- ◆ excellent snap and brittleness
- ◆ melt sharply and abruptly in the palate
- ◆ optimum flavour release
- ◆ good contraction for mould release
- ◆ no waxy after taste
- ◆ oxidative stability

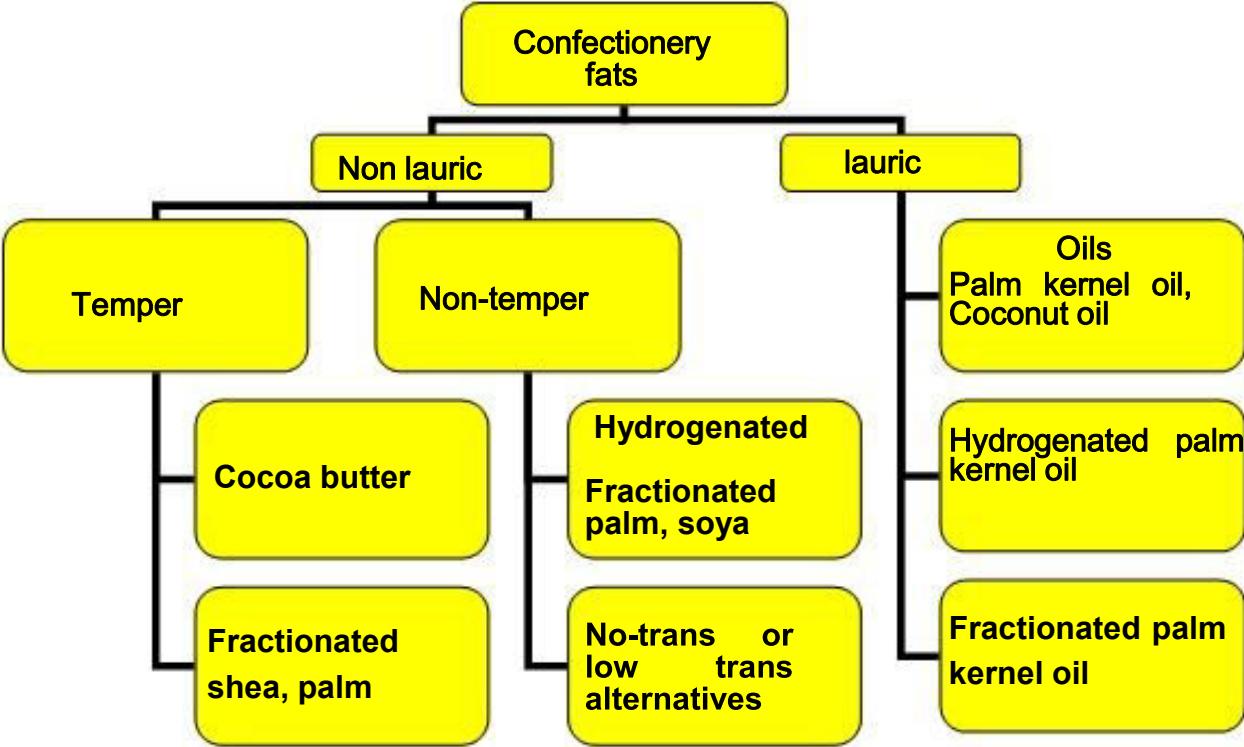


# CLASSIFICATION OF SPECIALTY FATS

# Classification of Specialty Fats

- ◆ Numerous terminologies have been used for the classification of Specialty Fats
- ◆ Basically, there are 3 types of Specialty Fats
  - ◆ **CBS** : from lauric fats like palm kernel oil
    - by fractionation & hydrogenation
  - ◆ **CBR** : from high polyunsaturated oils
    - by selective hydrogenation & fractionation
  - ◆ **CBE** : exotic fat range comprising of kokum fat, sal fat, mango fat etc: having SUS type triglyceride structure like cocoa butter
    - by fractionation or direct use

# Classification of Specialty Fats





# COCOA BUTTER EQUIVALENT

# Cocoa Butter Equivalents

- ◆ Obtained from special palm oil fractions and “exotic fats”
- ◆ CBE and CB show similar polymorphic behaviour
- ◆ Similar SOS TAG to CB
- ◆ Require tempering
- ◆ 100% Compatible with CB
- ◆ Product with 0% ***transfat***

# Cocoa Butter Equivalents

- ◆ Permitted in EU and some other countries for use as 'vegetable fats' in chocolate
- ◆ Restricted to maximum 5% of the chocolate (with some added restrictions which can reduce this even further)

# Cocoa Butter Equivalents

Mainly sourced from the following oils:

- ◆ Shea
- ◆ Illipe
- ◆ Sal
- ◆ Palm
- ◆ Kokum
- ◆ Mango kernel

# TG Composition of CB and CBE

	Cocoa butter	Palm fraction	Shea fraction	Illipe	Sal fraction	Kokum	Mango kernel fraction
POP	16	66	1	7	Trace	Trace	1
POSt	37	12	7	34	10	6	16
StOSt	26	3	74	45	60	72	59

Ref: Geoff Talbot

# COCOA BUTTER REPLACER

# Cocoa Butter Replacers

- ◆ Produced from oils such as palm, rapeseed and soyabean - usually by hydrogenation and / or fractionation
- ◆ Current development- Low trans CBR
- ◆ Contain palmitic, stearic and oleic acids but in a different configuration from that found in cocoa butter

# Cocoa Butter Replacers

- ◆ Partial tolerance to CB and therefore up to 20% CB can be used in formulations.
- ◆ Quick crystallization in  $\beta'$  crystals and therefore it doesn't need tempering.
- ◆ Good gloss retention
- ◆ Can be used in moulding and coating applications.



# Cocoa Butter Replacers

Available in two types

- ◆ High trans – Obtained majorly by hydrogenation of oils like Palm/palmolein. Soyabean, rapeseed etc
- ◆ Low trans – Trans content 4-10%. Obtained by blending of fractionated and hydrogenated products.



# **COCOA BUTTER SUBSTITUTES**

# Lauric Cocoa Butter Substitutes (CBS)

- ◆ Lauric Cocoa Butter Substitutes are normally made from Palm Kernel Oil (PKO)
- ◆ Physical fractionation of PKO yields a solid fraction known as Palm Kernel Stearin (PKS) and a liquid fraction called Palm Kernel Olein (PKL)

# Which fat for what purpose?

Other than the quality parameters, choice of the right fat for a particular purpose would depend mainly on :

- ◆ Compatibility with other fats like milk fat and cocoa butter
- ◆ Slip Melting Point
- ◆ **AND SOLID FAT CONTENT**

# Compatibility of Specialty Fats

- ◆ CBS fats have maximum compatibility of 5% with other non lauric fats (from cocoa powder, cocoa mass, skimmed/ full cream milk powder)
- ◆ Cocoa powder & skimmed milk powder must be free from lipase activity
- ◆ CBR fats have 20-25% compatibility with cocoa butter. However very high percentage of trans fatty acids in it is the nutritional concern
- ◆ CBE fats have 100% compatibility with cocoa butter

## New Trends

- ◆ LTCBR with better moulding characteristics
- ◆ CBS with good thermal stability
- ◆ Aerated chocolates
- ◆ Non hydrogenated CBS
- ◆ Low saturated filling fats
- ◆ Chocospread
- ◆ Bakestable fat for choco filling
- ◆ Fortified chocolates (with phytosterols, omega 3)
- ◆ Chocolates for Diabetics
- ◆ Nutrition bar

Thank You

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