

PALM-BASED CANDLE

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Candles are mainly used in religious ceremonies such as in churches and temples. They are also widely used for decorative purposes in restaurants, festivities and even in food-warmers in restaurants and hotels. Traditionally, beeswax and solid fats were used. However, the use of solid fats in candles was always objectionable because pyrolysis of these materials produced small quantities of acrolein, a pungent smelling and eye-watering component which gave an undesirable odour to the burning operation. The restriction of beeswax was mainly due to its high price. Later, with the increase in petroleum production and refining, paraffin wax, a by-product of the refining became the most important of all the waxes used in candle making primarily because of its lower price. However, it is predicted that its price will definitely increase in the near future since petroleum is a depleting source.

The wide range in the melting point of paraffin wax is one of the major drawbacks in handling candles made solely from it. In addition it gives

many undesirable properties such as black smoke and sags easily in hot climate. One of the ways to overcome these problems is to incorporate stearic acid. Thus, most modern candles contain approximately 5%-30% stearic acid with paraffin wax as the major component (Table 1).

CANDLE PRODUCTION PROCESSES

Generally, there are three common processes for producing candles :

- i) Dipping
- ii) Moulding
- iii) Extrusion

i) Dipping method

Dipping is the simplest way of making candles. The material is melted in a jug, the length of which is longer than the intended candle. The wick is lowered into the hot material for about 5 seconds

and gently withdrawn to allow the material to harden slightly. The process is repeated until the candle of desired thickness is obtained. The finished candle is allowed to cool and the wick trimmed and the base of the candle flattened with a knife. This method is labour intensive and the candles produced have an uneven surface.



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TABLE 1. CANDLE COMPOSITION

Component	TYPICAL FORMULATION %							
	1	2	3	4	5	6	7	8
Paraffin	60	70	60	75	67	48	60	85
Stearic acid	35	20	30	25	33	-	-	15
Beeswax	5	10	10	-	-	52	-	-
Japan wax	-	-	-	-	-	-	35	-
Synthetic wax	-	-	-	-	-	-	5	-

PALM FATTY ACIDS VERSUS PARAFFIN WAX AND TALLOW FATTY ACIDS IN CANDLE MAKING

	Palm fatty acids	Paraffin wax	Tallow fatty acids
1. Supply	Abundant and constant	Depleting	Depleting
2. Consistency	Characteristics of all batches are consistent	Vary in different batches	Vary in different batches
3. Ease of ejection	Easier	Difficult	Easier
4. Appearance of Candles	More shining, harder and firmer	less shining	more shining
5. Burning	less smoke, less dripping, longer burning life and can stand firm in hot climate	more black smoke, more dripping, shorter burning life, sag and warp easily.	less smoke, less dripping, longer burning life and can stand firm in hot climate.
6. Dispersivity of dye	easy	less easy	easy
7. Melting time	longer	shorter	almost same as palm fatty acids
8. Solidifying time	shorter	longer	shorter
9. Odour	good	moderate	bad
10. Religion	food grade, kosher and halal	non-food grade	not-kosher and non halal
11. Origin	local	import	import

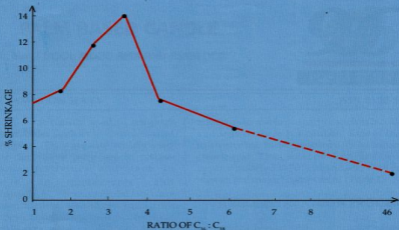


Figure 1. Effects of Ratio $C_{16} : C_{18}$ Acids on the Percentage of Shrinkage.

ii) Extrusion method

This method is more productive than dipping method. In this method, the material is melted and moulded to the desired shape, extruded and the wick is cut with a cutter.

iii) Moulding method

The mould used can be made from rubber, silicone rubber, metal or plaster of paris. It is used for more elaborate candles.

CANDLES FROM PALM FATTY ACIDS

Research at PORIM showed that the optimum palmitic to stearic ratio is around 3 to 3.5 to impart a maximum shrinkage which facilitate the demoulding of the candles (Figure 1).

A high percentage of palmitic acid was found to enhance the shrinkage and thus greatly facilitate demoulding of the candles. Such composition of fatty acids can be easily derived from palm stearin as a source of fatty acid.

All shapes and lengths including cylindrical, spiral, joss stick and decorative candles could be made from palm fatty acids with several advantages as indicated in the previous section. However, the amount of palm products used varies with different types of candles.

CONCLUSION

The study shows that the use of palm fatty acids in candle making is not only economically advantage but also produced good quality candles. The palm based candles produced possess several advantages over those from paraffin wax and tallow fatty acids.

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