

UNIVERSITI TEKNOLOGI MARA

**EFFECT OF STORAGE
TEMPERATURES ON THE
QUALITY AND SHELF OF
CHOCOLATE CAKE SIMULATING
RETAILED STORAGE IN
COMPLYING *HALALAN-TOYYIBAN*
REQUIREMENTS**

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Thesis submitted in fulfillment
of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

The *Halalan Toyyiban* Assurance Pipeline (HTAP) as stated in MS 2400:2010 (PART 1–3) guidelines links product manufacturers, goods and/or cargo with consumers. In order to determine the *Halal Toyyiban* Critical Point (HTCP), a risk analysis needs to be conducted first, in which risks are divided into *Shariah* and technical risks. Bakery products such as chocolate cake are very popular snacks in Malaysia, especially during festive seasons and wedding occasions. However, the quality of most cakes displayed at the bakery often deteriorate in terms of taste and physical appearance. It may be due to longer storage period and lack of awareness for proper storage. This may increase the risk for the cake to undergo microbial, chemical and physical spoilage. Hence, this research was conducted with the aim to investigate the technical risk aspect of chocolate cake during storage at the retail outlet, in meeting the *halalan-toyyiban* requirements according to MS 2400-3:2010 which determine the quality and physico-chemical properties, shelf life, and also the consumer acceptability of chocolate cake. The quality and physico-chemical properties of chocolate cake were determined by conducting the analysis of peroxide value (PV), thiobarbituric acid value (TBA), volatile compound, water activity (a_w), pH, and compression tests. Besides, the analysis of total plate count (TPC) and yeast and mould count (YMC) were conducted to determine the shelf life of chocolate cake, while quantitative descriptive analysis (QDA) was conducted to determine the consumer acceptability of the chocolate cake. All analyses were conducted at three different storage conditions, i.e. room ($25 \pm 1^\circ\text{C}$), chilled ($4 \pm 1^\circ\text{C}$) and frozen ($-18 \pm 1^\circ\text{C}$) temperatures. Therefore, the storage temperature simulated for retail outlet affect the physico-chemical properties of the chocolate cake as not undergone relevant oxidation due to low peroxide values and TBA values and also due to the absence of rancid compounds at the three storage temperatures. Meanwhile, the pH values of the chocolate cakes slightly decreased at three storage temperature, a_w also decrease as the storage temperature reduced and the firmness of the chocolate cake at frozen storage were lower than the firmness of the cakes at chilled and room temperature storage. According to microbiological quality, the storage conditions suggested were 3 days at room temperature, 80 days at chilled storage and up to 360 days at frozen storage. Thus, the appropriate retail storage conditions for chocolate cake, in meeting the *halalan-toyyiban* (technical risk) for food safety and quality requirements was up to 2 days at room ($25 \pm 1^\circ\text{C}$), 40 days at chilled ($4 \pm 1^\circ\text{C}$), and 300 days at frozen ($-18 \pm 1^\circ\text{C}$) storage temperatures. Hence, it can be concluded that chocolate cake stored at room and chilled temperature at retail outlet storage did not comply the *halalan-toyyiban* status at ≥ 4 days (room temperature) and ≥ 100 days (chilled temperature) of storage. However, the frozen chocolate cake complied with the *halalan-toyyiban* status until 360 days of storage even though there were slight reduction in the quality associated with texture and sensorial properties.

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