

**ATENÇÃO:** Este modelo **NÃO** representa uma prova integral, apenas parte dela.



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**CENTRO DE LÍNGUAS – EXAME DE PROFICIÊNCIA EM LÍNGUA INGLESA**  
**IF**  
**OUTUBRO / 2018**

Nome: \_\_\_\_\_

RG: \_\_\_\_\_

Assinatura: \_\_\_\_\_

**PARTE II: SOMENTE PARA CANDIDATOS AO DOUTORADO**

- Responda em INGLÊS.
- NÃO copie trechos do texto.
- Esta questão vale de 0 a 10 pontos.
- **Observação:**
  - A Parte I possui peso 2 e a Parte II possui peso 1.
  - A **Nota Final** será a média ponderada das duas provas (Parte I e Parte II):
  - **NF = (Parte I x 2) + (Parte II x 1)**

○ **3**

**EFFECT OF FREEZING TREATMENTS AND YEAST AMOUNT ON  
SENSORY AND PHYSICAL PROPERTIES OF SWEET BAKERY  
PRODUCTS**

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Disponível em: [www.elsevier.com](http://www.elsevier.com)

The frozen bakery market has increased significantly in developed countries in recent years. Baking terminals have proliferated in public places such as supermarkets, bakery shops, airports (Le Bail and Goff, 2008). This technology allows for a time lag between frozen dough and selling step and several advantages have been recognized

among them the standardization of the final product quality (Bárcenas and Rosell, 2007).

The quality of fresh bakery products is often related to its crust (thickness, crispiness, color, and taste) and to the crumb structure (flavor, soft texture, size of the cells). However, bakery products have a short shelf-life, and the loss of freshness influence negatively the product's quality and consumer acceptance, expressed by a number of chemical and physical changes (staling). Indeed, the appearance, odor, color, texture and flavor attributes are used to determine sensory properties of bakery products (Stone and Sidel, 2004). The product sale will certainly be a failure if some of these attributes do not meet consumer expectations. Each product has its characteristic sensory profile combining specific attributes.

The variety of frozen bakery products has increased significantly since their introduction to the market; this list includes breads and rolls, croissants, muffins, cakes, cookies, pastries, laminated dough, pizza (Decock and Cappelle, 2005).

However, each one of frozen bakery products has advantages and drawbacks. A major problem of the part-baked and fully baked frozen bakery product is crust flaking probably due to the intensity of thermo-mechanical shock during chilling-freezing and final baking (Le Bail et al., 2005). Carr et al. (2006) reported their products had a rougher crust and very compact crumb caused by freezing. The main competitor of the partly-baked and fully baked frozen bakery product is the unfermented frozen dough.

Despite the drawbacks, the frozen unfermented product has better prospective for the industry. However, unfermented frozen dough often exhibits a specific volume decrease manifested by an increase proofing time compared to fresh dough products during freezing and long frozen storage (Añón et al., 2004). Several authors suggested that the formulation and processing parameters such as freezing and thawing rate (Le Bail et al., 1998), frozen storage time (Lu and Grant, 1999) and mixing time (Rouille et al., 2000) influence significantly the bakery product quality obtained by frozen dough.

These parameters can act either independently or synergistically to reduce the yeast activity resulting in reduced gas production (Rosell and Gomez, 2007) or damage to the dough structure due to poor CO<sub>2</sub> retention (Wolt and D'Appolonia, 1984) and poor baking performance. Havet (2000) found a 20% decrease of bread specific volume obtained from dough frozen at -20 °C (3 m/s air velocity). Several studies have shown that the freezing rate was directly related to the ice crystals size causing the disruption on dough gluten network during freezing (Havet et al., 2000; Inoue and Bushuk, 1996; Kulp, 1995; Spiess, 1980).

The freezing rate plays an important role in the final quality of frozen product, two opposite effects are observed. A high freezing rate allows the formation of ice microcrystals, which do not affect the gluten network integrity, which reduces physical damage (disturbance and dehydration of gluten network) induced by freezing, ultimately to the extent that the starch granules appear to be associated with the network gluten (Angioloni et al., 2008). Nonetheless, rapid freezing might fatally compromise the yeast activity.

Olivera and Salvadori (2009) suggested that slow freezing formed large size ice crystals causing the disruption of dough gluten network during freezing. Mezziani et al. (2012) shown the dependence of fermentation activity and integrity of the gluten network with freezing rate, which controls size and location of ice crystals resulting in research of a compromise between freezing rate nor too fast to reduce yeast viability, nor too slow to form large ice crystals that could perforate gluten network.

The sensory characteristics of bakery products are heavily influenced by their formulation; the presence of some ingredients such as butter gives a characteristic flavor

to the final product. In addition to the raw materials used, the manufacturing process substantially alters the sensory properties of bakery product.

Most of these studies were interested to bread dough produced from a basic formula. This work is distinguished by the complexity of sweet dough formulation (high fat and sugar content) and use of cryogenic immersion to achieve freezing rates ultra-fast. These factors influence intrinsic dough properties. The milk and lipids contained in sweet dough which can contribute to cryoprotection, while sugar enhances yeast's growth before freezing (Meziani et al., 2012; Wolt and D'Appolonia, 1984). To elucidate this point, frozen sweet doughs were prepared by in the same conditions different freezing treatment. Similarly, use of natural additives like whey proteins, surfactants and enzymes are also gaining importance to control the water redistribution problems in the frozen doughs' structures (Asghar et al., 2011). No study on freezing rate and formulation effect on sweet dough properties with complex recipe have been published.

Kougelhoppf matrix was chosen in this study for its manufacturing process is similar to that of bread and complexity of its dough recipe. Kougelhoppf is a southern German, Austrian, Swiss and Alsatian term for a marble cake or Bundt cake; recognizes itself easily with high grooved form. The cake crust is light brown, sprinkled with icing sugar and decorated with almonds on top. **Its** tender and brioche crumb is strewn with raisins.

The objectives of this work were (i) to study the influence of freezing conditions and yeast quantity on physical, textural and sensory characteristics of fully baked sweet product Kougelhoppf and (ii) to compare these parameters to those obtained from fresh Kougelhoppf and (iii) to define the best freezing treatment and formulation for Kougelhoppf.

Escreva um **ABSTRACT** em inglês para o texto ***Effect of Freezing Treatments and Yeast Amount on Sensory and Physical Properties of Bakery Products.***

O modelo de abstract contém *objetivo, metodologia, resultado, recomendação, conclusões e palavras-chave*. No abstract que você irá criar a partir desse texto, você deverá escrever 100 a 140 palavras, relatando apenas as partes apresentadas nele. **NÃO COPIE TRECHOS DO TEXTO.**

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