Classification and Functional Properties of Processed Cheese

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Received: NOV. 12, 2013, Revised: NOV. 14, 2013, Accepted: NOV. 15, 2013

ABSTRACT

Processed cheese is manufactured by mixing natural cheeses with emulsifying salts and other ingredients and heating under agitation to produce a homogeneous product. Processed cheese, processed cheese food, and processed cheese spread are classified in the US standards for processed cheese. The functional properties of processed cheese, such as firmness and meltability, are regarded as a quality indicator assessing overall cheese quality and consumer preference. Various analytical methods have been developed to determine the functional properties of processed cheese. In this review, the classification and functional properties of processed cheeses are described and analytical tools for evaluating the functional properties of processed cheese are discussed.

Key words - Processed cheese, Classification, Functional property, Analytical method
I. Introduction

Processed cheese is manufactured by mixing various types of natural cheeses, emulsifying salts, and dairy and non-dairy ingredients including whey protein powder and salts. The cheese mixtures are then heated under a partial vacuum with a constant stirring to obtain homogeneous products, such as slices, shreds, and sauces (Piska & Štětina, 2004; Kapoor et al., 2007). The first processed cheese was developed by Gerber and Stettler (Gerber and Co., 1911) and was initially made to prolong the shelf life of natural cheese (Kapoor & Metzger, 2008). To prepare a smooth, homogeneous processed cheese, they mixed melted Swiss cheese with emulsifying salt (sodium citrate).

There are three major categories of processed cheeses: i) processed cheese, ii) processed cheese food, and iii) processed cheese spread. The functional properties of processed cheese including firmness and meltability are important factors affecting cheese quality and consumer preference (Blazquez et al., 2006; Lee & Lee, 2013). To produce processed cheese with good quality and consumer acceptability, it is necessary to understand how processed cheeses are classified and what analytical methods are used to determine the functional properties of processed cheese.

II. Classification of processed cheese

The US standards for processed cheeses are defined in the code of Federal Regulations, Title 21, Part 133 (FDA, 2013) as pasteurized processed cheese, pasteurized processed cheese food, and pasteurized processed cheese spread. The fat content of pasteurized processed cheeses is expressed as percent fat on a dry weight basis while other constituents are expressed on a wet weight basis (Zehren & Nusbaum, 1992). Characteristics of processed cheese, processed cheese food, and processed cheese spread are presented in Table 1.

2.1 Processed cheese

Processed cheese is a dairy product resulting from blending and heating one or more types of natural cheese with emulsifying salts into a homogeneous plastic mass (Kosikowski, 1977). The moisture and fat content of processed cheese are regulated according to the legal definitions, which apply to the natural cheese. For the processed cheese made with Cheddar cheese, the regulatory requirement for the moisture content and fat content of processed Cheddar cheese is no more than 40% moisture on a wet weight basis and no less than 43% fat on a dry weight basis (FDA, 2013).

Emulsifying salts commonly selected for processed cheeses are disodium phosphate, trisodium phosphate, and tetrascium pyrophosphate (Shimp, 1985). Emulsifying salts in processed cheese are used to supplement the emulsifying capabilities of cheese proteins such as casein by sequestering calcium and solubilizing cheese proteins (Caric & Kalab, 1999).

“The amount of emulsifying salts is not more than 3% of the weight of the processed cheese on a wet weight basis” (FDA, 2013).

Acidulents such as lactic acid or citric acid are limited to concentrations such that the pH of the processed cheese is not less than 5.3 (FDA, 2013). Water added to processed cheese is used to solubilize emulsifying salts. The amount of water added to processed cheese is controlled to conform to the legal moisture requirements. Preservatives include sorbic acid, potassium sorbate, sodium sorbate, sodium propionate, or calcium propionate (Zehren & Nusbaum, 1992).

“Processed cheese in consumer size packages may