



## CHANGES IN THE CONTENT OF OXYMETHYLFURFURAL (OMP) IN GRAPE JUICE UNDER THE INFLUENCE OF TEMPERATURE

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### Abstract

This article examines the formation of hydroxymethylfurfural (HMF, 5-hydroxymethylfurfural) in grapes and grape products, the factors influencing it, and its importance for food quality. It was found that the high glucose and fructose content of grapes leads to the formation of HMF during processing. Heat treatment, acidity, and storage time significantly affect the amount of HMF. It is concluded that HMF can be assessed as a quality indicator for grape products.

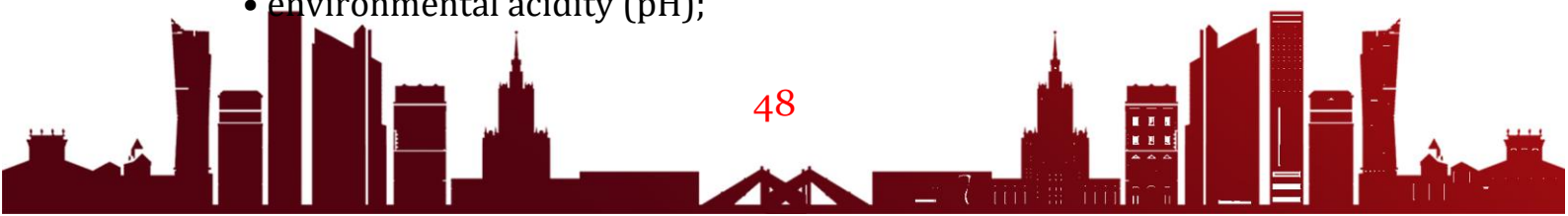
**Keywords:** grapes, hydroxymethylfurfural, 5-HMF, glucose, fructose, heat treatment.

Introduction. Climatic and agrotechnical conditions have a significant impact on the content of vitamins in berries and fruits [1]. In the process of processing food products, various additives are formed as a result of thermal and chemical changes in carbohydrates. One of them is oxymethylfurfural (OMP), which is formed mainly as a result of dehydration of hexose sugars. OMF is often found in honey, fruit juices, sugar-containing foods, and especially grape products. [2,3].

Due to the high content of glucose and fructose in grapes, there is a high probability of the formation of OMP (oligomeric methylcellulose) during processing. Therefore, the content of OMF in products such as grape juice, concentrate, becmes and blueberries is an important indicator of the correctness or incorrectness of the technological process. OMP is formed mainly as a result of dehydration of glucose and fructose under the influence of heat in an acidic environment. [4,5,6]. Studies show that fructose is more active in the formation of OMP than glucose.

The following factors have a strong influence on the formation of OMF:

- temperature increase;
- Increased processing time
- environmental acidity (pH);





- sugar concentration.

These processes often occur simultaneously with Maillard reactions, but OMF can be formed independently.

During heat treatment (pasteurization, boiling), the rate of OMF formation increases sharply at temperatures above 70-90 °C. The amount of OMF also gradually increases during storage. The amount of OMF found in common foods is not considered dangerous for most people. [7]. However, it has not yet been unequivocally proven that the amount of OMF consumed with conventional foods increases the risk of cancer. Some studies have shown that OMF can be converted in the body into other active substances. [8]. In laboratory studies, very high levels of OMF have been shown to:

- cause cell damage,
- increase oxidative stress,
- have some toxic effects.

Adverse effects on the liver and kidneys have been observed in some animal studies. [9,10].

The purpose of the work is to study the effect of the temperature regime of heat treatment on the formation of oxymethylfurfural (OMF) in grape juice, as well as to assess the possibility of using OMF content as an indicator of quality and an indicator of technological processing of grape products.

**Study methodology.** The study examined the effect of temperature on oxymethylfurfural (OMF) formation in grape production. During the experimental work, samples of grapes grown in the Kitaba district of Kashkadarya region were heat treated for 10 minutes at temperatures of 50, 60 and 70 °C. The amount of OMF was determined by Agilent 1100 High Performance Liquid Chromatography (HPLC-VWD) at 285 nm. The retention time of OMF was about 5.28 minutes. According to the results, at temperatures of 50-60 °C, the amount of OMF remained low, and at 70 °C its amount increased sharply.

According to the results, it was found that the amount of OMF increases with increasing temperature.

Table 1. Change in oxymethylfurfural (OMF) concentration in grape juice under different thermal treatment conditions (t = 10 min)

Sample Temperature, °C Time, min. OMF, mg/kg



Sample	Temperature, °C	Time, min.	HMF, mg/kg
Smp 10 min_50°C	50	10	0,137
Smp 10 min_60°C	60	10	0,206
Smp 10 min_70°C	70	10	3,68

The results show that at temperatures of 50-60 °C, the amount of OMP remains at a low level, while at 70 °C there is a sharp increase.

It has been found that the formation of OMF in grape products is highly temperature dependent. Therefore, temperature control is important when processing grape products.

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