

Optimization of the Formulation of Vitaminized Water-based Beverages Enriched with Oxygen

**Kuralai Mukanova¹, Saule Baitukenova¹, Maira Kazankapova²,
Mukhtar Tultabayev^{1, *}**

¹JSC "Kazakh University of Technology and Business named after K. Kulazhanov", Astana, Kazakhstan

²LLP "Institute of Coal Chemistry and Technology", Astana, Kazakhstan

Email address:

kuri78@mail.ru (Kuralai Mukanova), saule7272@mail.ru (Saule Baitukenova),
maira_1986@mail.ru (Maira Kazankapova), Yrath2510@gmail.com (Mukhtar Tultabayev)

*Corresponding author

Abstract

In recent years, there has been a significant increase in consumer interest in a healthy lifestyle and balanced nutrition. In this context, vitaminized water-based beverages enriched with oxygen attract particular attention due to their unique properties and potential health benefits. Vitaminized water-based beverages enriched with oxygen represent a special category of products. Investigating the influence of various factors—such as formulation components, saturation and storage conditions, as well as storage duration—on the physicochemical and rheological characteristics of these beverages is a relevant task. To optimize the formulation, we applied the Scheffé method based on simplex lattice design. This method enables the study of the effect of the proportion of each component on the final product characteristics, which is essential for developing a high-quality vitaminized beverage. The use of the Scheffé simplex lattice design in the development of production technologies for vitaminized water-based beverages enriched with oxygen made it possible to experimentally evaluate how different proportions of vitamins and other ingredients affect the physicochemical and organoleptic properties of the beverages. Analysis of the obtained results showed that a certain amount of vitamin C enhances the brightness of taste, but this effect depends on the specific concentration of flavoring agents. It was also found that increasing the oxygen concentration in the beverage positively influences taste perception; however, it reduces the stability of some vitamins. The results of the conducted analysis demonstrate that optimization using the Scheffé simplex lattice design in the development of production technologies for vitaminized beverages allows establishing patterns of component interactions and their influence on consumer characteristics of the beverages.

Keywords

Beverages, Oxygen, Vitamins, Health

Funding

This research was funded by the grant project No. AP23488817 “Development of technology for the production of fortified drinks enriched with oxygen using the Scheffe simplex lattice plan” funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan for 2024-2026.