

## Laser light scattering by milk particles

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### Abstract

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**Introduction.** The main objective of this article is the theoretical and experimental study of laser light scattering by milk particles and the analysis of the character of size distribution of milk particles depending on the concentration and the heating of the samples during the technological processes.

**Materials and methods.** Theory of light scattering and the dependence of the coefficient of scattering on the wavelength of light and parameters of milk particles are discussed. The experimental investigation of light scattering by milk particles was done with the photon correlation spectrometer *System 4700c*.

**Results and discussion.** Different types of scattering such as Rayleigh Scattering, Rayleigh-Gans Scattering, Anomalous Diffraction, and corresponding coefficients of scattering are discussed. Histograms of size distribution of the diluted ( $C \leq 10^{-3}$  %) milk (temperature 25 °C) and samples of milk with different fat concentration (4.2%; 5.2%; 7.4% at temperature 20 °C and 7.4% at temperature 50 °C), just as the dependence of the intensity of scattered light on the angle of observation were studied.

The method of light scattering can be used for analysis of the effect of milk content and technological processes which are related to heating (pasteurization, sterilization, homogenization) on the size distribution of milk particles.

**Conclusions.** Laser light scattering is an advanced technique that can be used to determine the size distribution profile of milk particles. It is characterised with high accuracy, non-destructive action and does not require calibration standards.

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## Conclusions

Using of heat preconditioning with antioxidants before storage of sweet bell pepper fruits leads to decreasing of oxidative damage induced by cooling. Heat preconditioning with antioxidants has a noticeable influence on the content of lipid peroxidation products. In studied groups of pepper level of malondialdehyde stays stable in both hybrids till 12th day of storage. If storage was continued, growth of lipid peroxidation products in conditioned samples has been maintained minimal. Level of MDA in studied samples is lower in 1,7 times in average for Hercules hybrid and twice for Nikita hybrid. This is a confirmation of lipid peroxidation inhibition by exogenous antioxidants.

Heat preconditioning with antioxidants decreases speed of SOD deactivation by 25% and CAT by 30...50%. Heat treatment with antioxidants decreases also speed of peroxidase deactivation in sweet bell pepper fruits and postpone a moment of increasing of its activity. Activity of this enzyme in studied fruits of both hybrids on 18<sup>th</sup> day is twice higher compared to the control. This lets longer maintenance of hydrogen peroxide concentration on the stationary level. Strong reverse correlations between the content of malondialdehyde and activities of superoxide dismutase, catalase and peroxidase were found and testify to antioxidant functions of these enzymes in control and studied groups of fruits.

Combination of heat and antioxidant treatment for preparation to the storage of sweet bell pepper fruits lets prolong maintenance of functioning of the system responsible for reactive oxygen species utilization.

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