

Formation conformities of crystalline formations of milk fat fractions as a regulator of butter textures

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Milk fat fractions are widely used in production of butter in dairy as well as other branches of industry. Consistency of these products is first of all determined by crystalline texture of their fatty phase. Knowledge of formation conformities of utilized fractions favours creating a more perfect composition of a product's ingredients and the purposeful regulating of its structure.

Formation conformities of crystalline formations of milk fat fractions have been investigated in our University.

Milk fat was divided into six fractions at the following temperatures: +20, 13, 5, 0 and -18 °C. To explore the formation conformities of the phase of crystalline formations methods of microscopy in polarized light, differential scanning calorimetry, X-ray diffraction, gas-liquid chromatography were used for determining triglyceride and fatty acid composition consistency of fractions. Crystals' formation and their melting were observed in polarized light of a microscope equipped with a specially constructed cooling and heating table and device for regulating fraction melting with a setting velocity.

Microscopic researches revealed that triglycerides of all the fractions created spherulites. It was determined that in high-melting fractions 1 and 2 large spherulites consisting of needle-shaped crystals were formed. Radial growth of spherulites during which radially orientated as to the centre of the spherulite polycrystalline ramified spiral fibres was noticed. Neighboring spherulites intertwine in consequence of cohesion of perimetric long needle-shaped crystals, forming crystalline structure of the solid phase.

The appearance, growth and formation of spherulites in all the fractions, the influence of their chemical composition and cooling regimes on the texture of the solid phase, its rheological properties were discussed in details. During the mixture crystallization, with lowering of the temperature of isolation, the density of the molecules' packing decreased.

Conformities of hardening and co-crystallization of triglycerides of milk fat fractions were formulated in correspondence with its fat acid and triglyceride structure and cooling regimes.

Conclusions about usage of the fractions and their heating regimes for regulation of textures of butter were made.