

it reaches the highest value and then almost does not change for a long time, remaining, however, significantly lower than in the spectrum of reactive maltotriose. There is only one explanation for this: the product of dehydration includes excess moisture, which is fairly strongly retained in the structure of the formed substance.

During the dehydration of the solution, not only the intensity of individual bands in the spectra changes, but also their nature. Thus, the most high-frequency of the $\nu(\text{OH})$ bands, changing little in the initial stages of drying, after 3 - 3.5 hours of aging, narrows rather quickly, Fig. 3(a).

At the same time, its profile changes: the flattened top, which is typical for water, is replaced by a single maximum with an almost Gaussian character. The moment of the beginning of the transformation of the top of the line coincides with the appearance of absorption on its slope facing low frequencies, which refers to a complex of symmetric and asymmetric vibrations of C-H bonds in a saccharide molecule [3 - 6]. Such a transformation is also manifested at the maximum $\delta(\text{OH})$, which also increases its frequency stepwise, Fig. 3(b).

Changes in the spectra are even more significant in the region of stretching vibrations of the chemical bonds C-O and C-C. In Fig. 3(c) it can be seen that the profile of the dominant maxima is almost the same before the start of the above-mentioned transformation, and when it begins, it changes greatly with the frequency of the maximum. It should be noted that in this case, the strongest changes in the lines in the spectra of dehydration products coincide with the end of the jump in Fig. 2. Based on this, it can be stated that as the sample is dehydrated, the state of not only water but also saccharide molecules changes, that is there is a mutual effect of the solvent and the solute. And, judging by the nature of the IR spectra, the magnitude of this effect depends on the water/saccharide ratio.

The graphical analysis showed that the dominant maxima in the IR spectra of maltotriose and the product formed as a result of the drying of its aqueous solution are structurally different, although they consist of almost the same number of components, (Fig. 4). Thus, the lowest-frequency component from the spectrum of maltotriose turns out to be noticeably larger in the spectrum of the dehydration product, and the frequency following it, on the contrary, weakens. This confirms that maltotriose and the substance that formed from its

aqueous solution as a result of drying are not identical substances. The differences are indicated by the results of the study of both substances using the method of thermal analysis. According to them, the residual water begins to leave the product of dehydration no sooner than reactive maltotriose, as might be expected, but $\sim 30^\circ\text{C}$ later, (Fig. 5). The loss of moisture when heated with

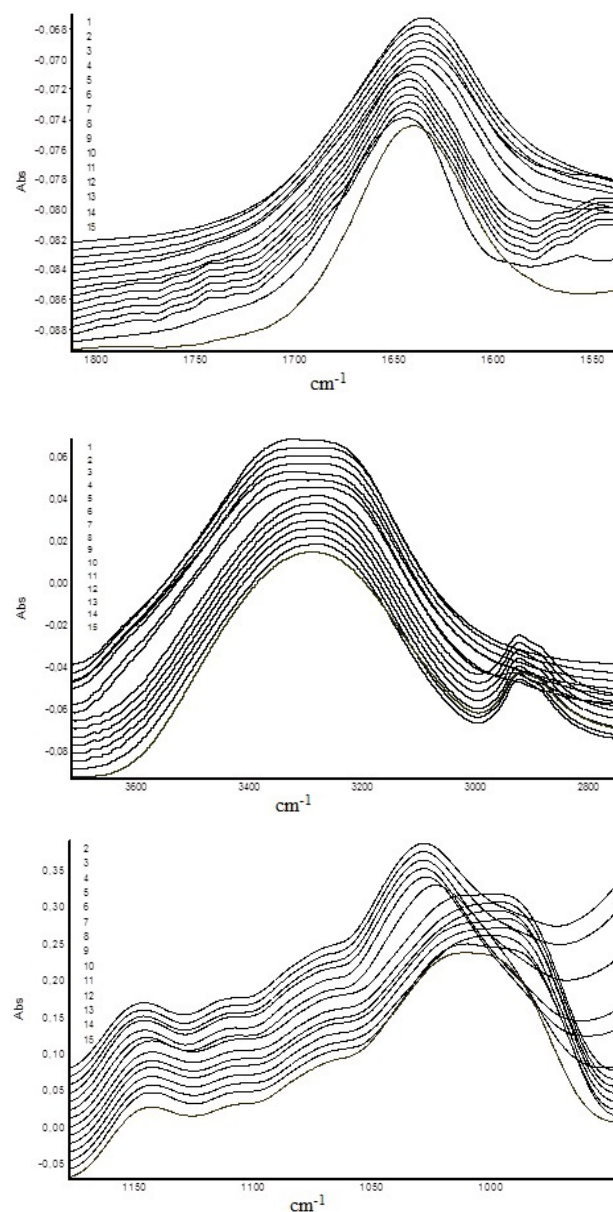


Fig. 3. High- and low-frequency regions (a-c) of the IR-Fourier spectra of water (1), an aqueous solution of maltotriose with a holding time, hour: 0.5 (2), 1.0 (3), 1.5 (4), 2.0 (5), 2.3 (6), 3.0 (7), 3.5 (8), 4.0 (9), 4.3 (10), 4.7 (11), 5.0 (12), 6.0 (13), 24 (14) and maltotriose (15). Spectra are numbered from top to bottom.