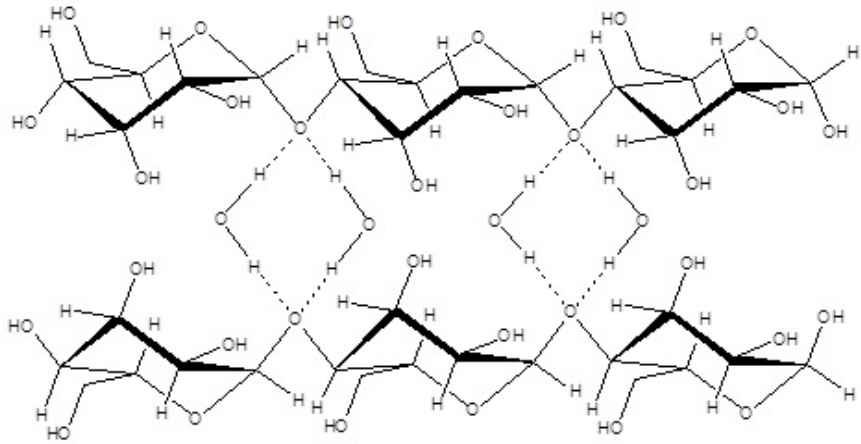

Fig. 6. The scheme of the dehydration of an aqueous solution of maltotriose offered on the base of IR-Fourier spectroscopy-research.

vibrations of α-glycosidic bonds.

Therefore, a change in the magnitude of the corresponding calculated maximum in the spectrum of the dehydration product may be caused by changes in α-glycosidic bridges under the influence of structurally related water molecules. The amount of the latter, found thermoanalytically by reducing the weight of the sample when heated, being related to the amount of carbohydrate in the sample, gives a molecular ratio of water/saccharide in the product close to two. This means that for each α-glycosidic bridge there is one H_2O molecule. The most likely structure of dehydrated maltotriose can be represented by a scheme (Fig. 6) in which the water molecules bind simultaneously with two saccharide molecules, acting as a crosslinking agent.

Crosslinking can be one of the reasons for the high viscosity of the maltotriose that is not fully dehydrated and that water is retained in it after drying under room conditions.

Similar to maltotriose, when dehydrating aqueous solutions, other individual oligosaccharides behave with up to 7 pyranose cycles in molecules. The dynamics of the main lines in their IR spectra are almost the same, and the products of dehydration at room temperature also contain water and carbohydrate in a form different from the individual compounds.

CONCLUSIONS

Thus, changes in the intensity, frequency and nature of the main peaks in the IR spectra of maltotriose aqueous solutions occurring during dehydration indicate a significant mutual effect of the components of the solutions at the level of chemical bonds and molecules. Compared with reactive maltotriose, the product of the dehydration of an aqueous solution of this substance contains much more water, which, moreover, is more strongly associated with the trisaccharide. According to the results of the study, it can be assumed that water in the dehydration product is associated with α-glycosidic bridges of the individual trisaccharide molecules, due to which cross-linking between them and the formation of viscous substances and films are ensured. Individual oligosaccharides with the number of pyranose cycles in molecules 4 - 7 with the dehydration of their aqueous solutions behave in the same way, which allows to extend the conclusions about the behavior of maltotriose and to them.

REFERENCES

1. X. Liu, A Novel Procedure for Qualifying and Quantifying Carbohydrates: by Derivatization of Mono-Di- and Trisaccharides and Gas Chromatography, LAP Lambert Academic Publishing, 2012, 80 p. ISBN 978-3847329725.
2. K.S. Docherty, P.J. Ziemann, On-line, inlet-based trimethylsilyl derivatization for gas chromatography of mono- and dicarboxylic acids, Journal of Chromatography A, 921, 2, 2001, 265-275, https://doi.org/10.1016/S0021-9673(01)00864-0.
3. M. Ibrahim, M. Alaam, H. El-Haes, A.F. Jalbout, A. de Leon, Analysis of the structure and vibrational spectra of glucose and fructose, Eclética Química, 31, 3, 2006, 15-21, http://dx.doi.org/10.1590/S0100-46702006000300002.