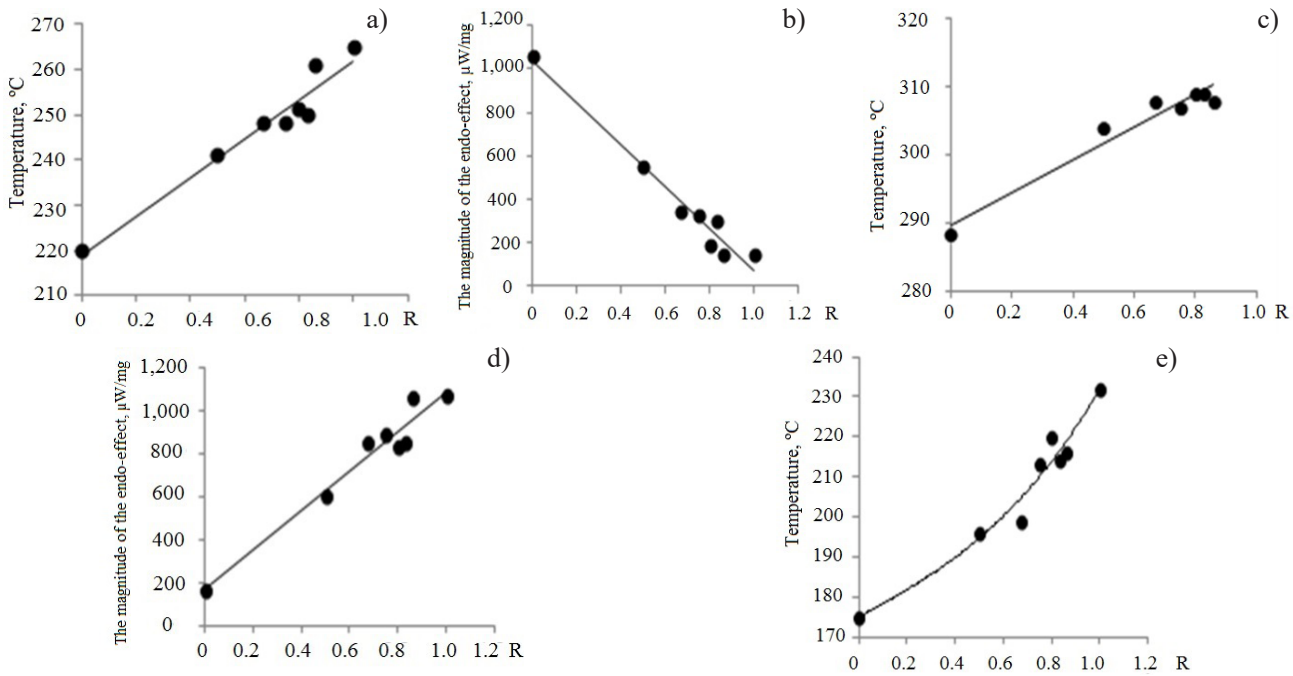

Fig. 2. The effect of the ratio of the number of α-glycosidic bonds to the number of pyranose rings in carbohydrate molecules (R) on the temperature of the minimum and the value of the second (a, b) and third endo effects (c, d, e).

position of glucose could be associated with the imposition of exothermic reactions between the thermolysis products of the saccharide on the main process, in the case of maltose, the situation is probably more natural: a significant reduction in weight corresponds to a significant heat absorption.

The rest of the studied oligosaccharides character of DSC and TG curves is almost the same as maltose, but there are quantitative differences. Thus, with an increase in the degree of polymerization of carbohydrates or with an increase in the ratio of the number of α-glycosidic bonds to the number of pyranose rings in the molecules of substances, the temperature of the second endo-effect increases, and its area decreases. In this case, the third thermal effect increases at a practically constant temperature (Fig. 2). As for the first stage of transformations, due to the presence of different amounts of adsorbed moisture in substances, the magnitude of the corresponding thermal effects in this work was not analyzed.

The most polymerized of saccharides with only α-glycosidic bonds, amylose, should form a natural continuation of a number of carbohydrates studied. Fig. 1(b) confirms that in general this is the case. In accordance with the tendencies shown in the Fig. 1(b), the second endo-effect on the DSC amylose curve is very close to the third one, almost fused with it, and greatly weakened, and the third one, on the contrary, is strengthened.

Since amylose is one of the two main components of natural starches, it was of interest to touch upon the issue of the thermal behavior of the second macro-component of starch, amylopectin. From the Fig. 1(d) it follows that this substance by its behavior when heated resembles amylose. Indeed, the first stage of transformations in it involves the loss of moisture, accompanied by a slight heat absorption. This is followed by two mutually overlapping stages of endo-thermic decomposition, which, however, are more distinguishable than in the case of amylose.

It should be noted that both the temperatures and the magnitudes of the endo-effects on the DSC curve of amylopectin go beyond the dependencies shown in the Fig. 2. And this is quite natural, since the structure of amylopectin is significantly different from linear saccharides.

CONCLUSIONS

Thus, individual linear carbohydrates built from glucose rings interconnected by α-glycosidic bonds, starting from glucose itself and ending with high-polymer amylose, undergo a certain transformation when heated in a nitrogen atmosphere. First, adsorbed and crystalline hydrated moisture is removed from the substances with the melting of some of the saccharides. Next, destruction