

STARCH BIOPLASTIC PRODUCTION

Kaidaniuk D.O.

National Aviation University, Kyiv

Scientific advisor – Drazhnikova A.V., Sen.Lecturer

Plastic production is a necessity for humanity today. It is impossible to imagine an industry without it, whether it is the production of children's toys or the production of test tubes. However, the issue of environmental pollution is growing in direct proportion to the increase in plastic production. For example, mankind has created about 380 tons of plastic in 2018, of which only a small part was disposed of. Therefore, the issue of alternatives to plastics that are tolerant of the environment and human health is only gaining momentum.

The main task of this work is to create a viable bioplastic from starch that can compete in the market with the usual sample. In fact, starch has long been used in this industry, this polysaccharide is a successful raw material for plastic production due to its properties, which are provided by its components: amylase and amylopectin, amylase in turn responsible for stickiness and water absorption, and amylopectin for strength [1]. Also, the composition of proposed bioplastics includes water, glycerin, and vinegar.

The experimental part can be divided into 3 parts: the first one is the mixing of all components (water, starch, glycerin, and vinegar) and homogenization of the mixture by stirring, the second part is heating (optimum temperature 50-60 °C) with continuous mixing (7-9 minutes) to obtain a sticky substance, and the third part is the packaging and drying (at room temperature, approximately 14-18 °C) of the resulting product. In 4-7 days we can obtain ready ecologically safe bioplastic which has rather quite good indicators of flexibility and durability. In turn, depending on the duration of drying, the indicators will be improved.

The main advantages of starch based bioplastic over conventional plastic: non-toxicity, the possibility of environmentally safe biodegradation. Further improvement of the recipe will provide the opportunity to use bioplastics in the production of such products as fruit baskets, phone cases, pens, and more.

It can also be noted that an important aspect of the work is to study the biotechnology of the process of bioplastic production from starch, in order to obtain the most effective formulation, and accordingly the product, with the most relevant properties, such as flexibility and strength against mechanical factors.

Reference:

1. Tang H., Ando H., Watanabe K. *et al.* Fine structures of amylose and amylopectin from large, medium and small waxy barley starch granules. *Cereal Chemistry*. 2001. Vol. 78. P. 111–115.