

DEPENDENCE OF THE FLOW RATE INDICATOR OF THE POLYMER COMPOUND MILL ON THE FILLING CONTENT

Almatayev Nozimbek Tojiboy ugli

Senior Lecturer of Andijan State Technical Institute

Annotation. In this work, the physical properties of the composite of the polymer mixture from the kaolin content were studied. The polymer composite was made by mixing a polymer mixture of filler powder to obtain the desired properties.

Keywords: properties, polymer, filler, mixture, fluidity.

Introduction. In the modern world, in many areas of human activity, synthetic materials have replaced natural materials, which have become widespread due to lower cost and greater diversity of properties. Another important advantage of synthetic materials is the possibility of further improving existing ones, creating new materials and technologies for their production by selecting raw materials, their ratio in the raw mixture, called the composition, and technological parameters. This allows optimizing the properties of synthetic materials for specific operating conditions and expanding the possibilities of their use by obtaining materials with a set of new technological and operational properties.

From the point of view of the further development of technologies for obtaining and subsequent application, composite materials or composites are materials consisting of two or more components, the quantity of which must be comparable and lead to the formation of the required structure and properties. In this case, one of the components, called a matrix or connector, forms a continuous phase in the material, in which other components, called fillers, are distributed [1].

Currently, polymer composite materials (PCM), in which the polymer in its pure form or polymer binder acts as the matrix, are becoming increasingly widespread and developing. A polymer binder is understood as a polymer-based composition with the addition of various additives, such as plasticizers, stabilizers, solvents, etc. [2].

Thermoplastics, in turn, are characterized by higher impact toughness, cracking resistance, lower resistance than reaction plastics, residual stresses and chemical shrinkage, as well as the possibility of secondary processing and the absence of solvent extraction. In addition, reactoplasts are characterized by brittleness and a longer formation cycle due to the course of hardening reactions, while thermoplastics are characterized by the unlimited viability of raw materials and semi-finished products due to the absence of hardening reactions. However, in this case, thermoplastics are characterized by faster aging (irreversible deterioration of properties under the influence of the environment) [3], higher viscosity of solutions and melts. It should also be noted that thermoplastics are divided into amorphous and partially crystalline polymers.

In recent years, polypropylene has proven itself as one of the most interesting

commercial thermoplastics. Since polypropylene (PP) is widely used in many scientific, industrial, and everyday purposes, since it is a universal and inexpensive material.

In general, the physical and mechanical properties of polymer composites with dispersed fillers strongly depend on the size, shape, and distribution of filler particles in the polymer matrix, as well as on the degree of interphase adhesion between the filler and the matrix [4,5].

The purpose of this work is to develop a new type of PP mixture filled with local Angrenskum (Uzbekistan) kaolin as a filler, to determine the physical properties of filled and unfilled PP mixtures.

Objects and methods of research

In this work, the physical properties of PP and kaolin mixtures were investigated. PP used for this study was supplied by Uz-Kor Gaz LLC, and Kaolin is produced in Angren (Uzbekistan) by Angren Kaolin LLC.

Preliminarily, all PP components and kaolin were manually mixed for 15 minutes and then loaded into a laboratory two-bladed extruder. The temperature of the shaft was monitored and controlled by a thermostat. The head temperature was also controlled by a thermostat and adjusted together with the cylinder temperature to ensure uniform output.

The temperature is measured in different zones of the extruder. The extruder produced monofiber with a diameter of 2 mm, which was cooled in air. Mononite, obtained at a screw speed (85 rpm), was homogeneous and opaque; it was cut into granules (3-4) mm long.

Samples for testing different particle sizes (25) μm of filler were manufactured by the pouring method under pressure at a temperature of 220-240°C. The obtained samples were held at a temperature of 23°C and a relative humidity of 50% for at least 40 hours for measurement of physical and mechanical parameters, in accordance with the requirements of ISO and GMW.

Testing of composites on PTR was carried out according to ISO 1133 on a testing machine (*Tinius Olsen MP 1200*).

Results:

***Figure 1* shows the change in the PTP of the obtained compound depending on the kaolin content.**

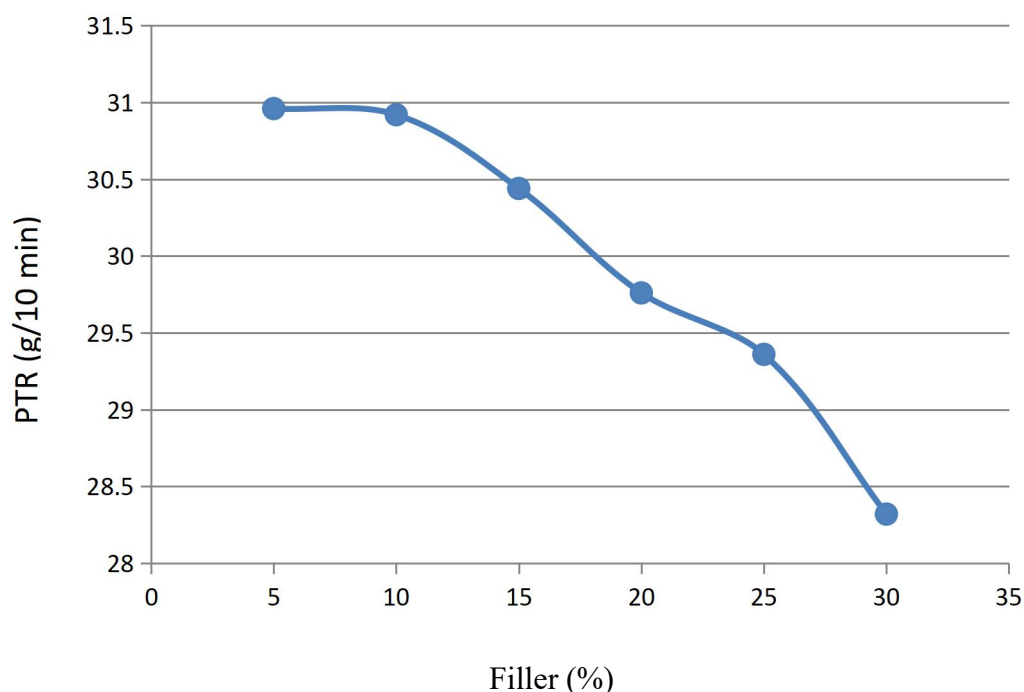


Fig. 1. Dependence of PTR compound on kaolin content

From Fig. 1, it can be seen that the addition of kaolin to the base PP leads to a decrease in PTP. For example, with a 5% kaolin content, the PTP of the compound is 30.96 g/10 min, and an increase in the kaolin content by 30% leads to a decrease in the PTP of the compound by 28.32 g/10 min. From the obtained results, it can be seen that PTP=1 g/10 min is achieved by adding low-flowing kaolin.

Based on the conducted research, the possibility of regulating the value of such an important technological indicator as PTP is shown. It can be said that the addition of kaolin reduces the viscosity of the system proportionally to its share. Thus, to achieve the goals, other important characteristics of the compound can also be regulated.

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