

STUDY OF THERMAL STABILITY OF MATERIALS BASED ON MODIFIED WOOD SHAVINGS

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Abstract. In scientific researches, the method of thermal analysis was applied to wood shavings untreated with polymer glues and urea-formaldehyde, acrylic styrene copolymer, and polymerized melamine in different proportions (1:1:0.5), (1:1:1), (1:0.5: 1) was studied on the basis of a relative comparison of the thermal stability of boards based on wood scraps treated with used polymer glues, and according to the results obtained, it was determined that the thermal stability of wood scraps modified with polymer glues obtained in a ratio of 1:0.5:1 had higher thermal properties than other compositions.

Keywords: a tile consists of wood shavings, polymer composites, building materials, thermal destruction, melamine, oxygen index.

Introduction. Boards made of wood shavings are an economically efficient and high mechanical properties building material, which is widely used mainly in the equipment of buildings and constructions. Boards consisting of wood shavings are widely used building materials in many countries of the world [1,2]. As a result of wood waste processing, shavings are obtained from this material, and tiles are made from them and often used for furniture production [1,3,4,5].



Boards made of wood shavings

Boards made of wood shavings cannot be compared with products made of solid wood, but the furniture industry and various decorative wood coatings are relatively economically efficient, stable to external influences, and fire resistant compared to wood. Composites obtained as a result of modification of polymer glues with wood shavings have high mechanical properties, keep their shape well, and shelves made of this material are resistant to high loads [6, 7, 8].

In addition, the use of boards made of wood shavings as building materials is relatively easy to produce from them in various shapes, and due to these properties, it allows to reduce the release of various particles into the environment [8].

Methods and materials. One of the main disadvantages of these boards made of wood shavings can be significant changes in the shape of materials under the influence of water, in addition, it is noted that furniture and other coverings obtained from this type of material do not

meet the requirements for re-use, and the adhesion of the used polymer glues under the influence of temperature.

Results and discussion. Analyzing the above data, we studied the influence of binders on the stability of external influences and temperature in the production of boards based on wood shavings. For this, using urea-formaldehyde, acrylic styrene copolymer and polymerized melamine to increase adhesion and water stability, glue composite in different ratios (1:1:0.5), (1:1:1), (1:0.5:1) we used It was determined that the thermal destruction of the tiles made of wood shavings varies step by step at temperatures from 20°C to 600°C.

With the help of thermal analysis, it is possible to study the temperature limits of many existing compounds, the temperature of phase changes, heat capacity, thermal conductivity of solid and liquid phases, thermal decomposition, dehydration, dissociation (separation into components), melting and chemical interactions of many synthetic and natural substances.

In scientific researches, the method of thermal analysis was applied to wood shavings untreated with polymer glues and urea-formaldehyde, acrylic styrene copolymer, and polymerized melamine in different proportions (1:1:0.5), (1:1:1), (1:0.5:1) was studied on the basis of a relative comparison of the thermal stability of boards based on wood shavings treated with used polymer glues. Figure 1 shows the thermal analysis of the original, untreated wood chips.

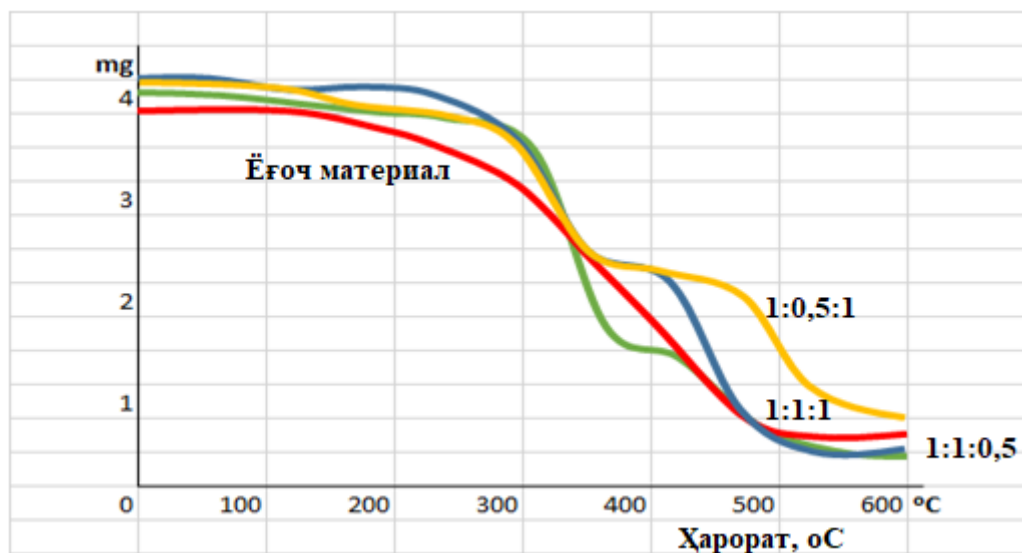


Figure 1. Thermal analysis (TG) of materials treated with sawdust and polymer binders.

When the thermal analysis of wood shavings was studied, the main temperature effect was 64.4% of the mass loss of the sample in the temperature range of 120-350°C. As the temperature increased to 300-315°C, the maximum heat release (exoeffect) was observed and the mass loss was 38.9%. As a result of these thermal changes, it was found that the high level of destruction of wood shavings is between 280-340°C, forming 33-38% coke layers.

Thermal stability of boards based on modified wood shavings using urea-formaldehyde, acrylic styrene copolymer and polymerized melamine in different ratios (1:1:0.5), (1:1:1), (1:0.5:1) the research results are presented below.

Using different ratios (1:1:0.5) of wood shavings, urea-formaldehyde, acrylic styrene copolymer and polymerized melamine, the mass loss of boards based on wood shavings in the temperature range of 155-430°C was 51.0%.

The maximum heat dissipation efficiency (exoeffect) was observed at the temperature of 367°C and the mass loss was 40.3%. In addition, the oxygen index of boards based on wood shavings was equal to 23-24%.

The mass loss of boards based on modified wood shavings using different ratios (1:1:1) of urea-formaldehyde, acrylic styrene copolymer and polymerized melamine in the temperature range of 158-355°C was 52.6%.

The maximum thermal decomposition efficiency (exoeffect) was observed at a temperature of 348°C, and the mass loss up to this temperature was 42.4%, indicating that the maximum degree of thermal decomposition occurs at low temperatures. In addition, the oxygen index of boards based on wood shavings was equal to 23-23.5%.

The mass loss of boards based on wood shavings modified by using different ratios (1:0.5:1) of urea-formaldehyde, acrylic styrene copolymer and polymerized melamine in the temperature range of 164-380°C was 48.6%. The maximum heat dissipation efficiency (exo-effect) was observed for plates based on wood shavings at a temperature of 352°C, and the mass loss was 39.2%.

Conclusion. Thus, wood shavings based on modified wood shavings using urea-formaldehyde, acrylic styrene copolymer and polymerized melamine in different proportions (1:1:0.5), (1:1:1), (1:0.5:1) the thermal stability of the plates was investigated and according to the results obtained, it was found that the thermal stability of wood shavings modified with polymer glues obtained in the ratio of 1:0.5:1 had higher thermal properties than other compositions.

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