INFLUENCE OF THE NATURE OF FILM FORMING AGENTS ON THERMAL PROTECTIVE PROPERTIES OF FOAMABLE COMPOSITIONS

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Abstract: Fire protection of building structures and their elements made of polymer composite materials is carried out using fire clutch equipped with liners made of expandable materials. In the event of fire, the overlap of flame spread along the polymer communications is ensured due to the formation of the fire-insulating foam barrier which does not allow the polymer fusible material to heat up to 120 °C. To clarify reasons for their fire-thermal protective efficiency, comparative studies of the thermal and physical-mechanical properties of two foamed compositions and products of their thermal treatment were carried out. Compositions with the same gas-coke-forming system (ammonium polyphosphate / pentaerythritol / dolomite / thermally expanding graphite) differed in the nature of the binder and thermal protection efficiency. In the course of the study, the following techniques were involved: complex thermal, X-ray phase analyzes, scanning electron microscopy as well as a number of standard and original techniques. It is found that the best physicomechanical, thermal insulating, morphological properties of the thermolysis products of the investigated thermofoamable compositions are achieved by overlapping the temperature ranges of the formation of organomineral framework and volatile thermolysis products. The information obtained on the effect of combining the temperature ranges of the formation of gaseous products by polymer binders and the organomineral framework by the studied gas-coke-forming systems on the qualitative and quantitative characteristics of thermofoamable compositions allows a targeted approach to increasing the efficiency of known foamed compositions and the choice of ingredients for creating new thermal protective materials with improved properties.

Keywords: thermofoamable composition; polymer binder; gas-coke-forming system; fire-thermal protective efficiency; physical and mechanical, thermal properties

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Figure Captions

Figure 1 The DSC research data for binders (*a*), thermofoamable compositions (TFCs) (*b*), and gas-coke-forming system (*c*): *1* — Mowilith binder and TFC1 based on Mowilith; and *2* — Osakril binder and TFC2 based on Osakril

Figure 2 The DTG data for binders (*a*), TFCs (*b*), and gas-coke-forming system (*c*): *1* — Mowilith binder and TFC1 based on Mowilith; and *2* — Osakril binder and TFC2 based on Osakril

Figure 3 The SEM data (×2000) on the morphological structure of sections of foamed thermolysis products: (*a*) TFC1; and (*b*) TFC2

Table Caption

The X-ray phase analysis data and physical state of thermolysis products of the gas-coke-forming system

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