A factors of the unstable initiation and propagation of combustion waves in thermite mixtures

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The effect of porosity, the energy of electric spark initiation, and the diameter of the linear channel on the formation of a combustion wave in thermite mixtures of Al+CuO and Al+Bi2O3 is studied.Photos of the combustion wave propagation in a channel with transparent walls show spatial inhomogeneity of radiation. In a number of experiments, before the constant velocity value is established, the dynamics of the frontal part of the combustion region has an exponential character of development. In experiments with opaque dielectric walls, the current was measured across the local reaction region. The dynamics of electrical conductivity in the front of the combustion wave is oscillatory in nature against the background of its value growth, which can also be approximated by an exponential function. At low currents through the initiating spark or a small charge diameter, combustion collapse occurred. At the same time, a spotty structure of the cross–section of the unburned mixture was observed, and characteristic signs of reaction intermediates were observed on the channel walls. With a more complete combustion of the mixture, the final products of the reaction were mainly found on the walls of the channel. The increased porosity of the mixture in the channel increases the filtration rate of hot intermediates, but increases the probability of combustion collapse. The report discusses the influence of the mixture, initiation and channel parameters on the detected trends in the combustion wave dynamics.