

# Estimation of efficiency of transformation of energy at combustion mixture of Al+CuO powders in the closed volume

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The efficiency of energy conversion in a closed volume was assessed on the basis of underwater combustion of a thermite stoichiometric mixture of Al and CuO powders. At the same time, the assessment is based on the assumption that chemical energy is consumed only for the process of underwater vaporization. Mechanically activated mixtures of powders of nano- and micron sizes were used in the experiments. The mass of the mixture was 0.1 g in one experiment. To initiate the chemical interaction between the components of the mixture, an electric spark energy of 50 mJ was used with an average power of 100 kW. The assessments were based on photographic photographs of the volume of the vapor bubble formed during the underwater combustion of a sample of the mixture. Consecutive images demonstrate the dynamics of the bubble volume over time. The dynamics of the bubble volume are well approximated by a negative parabola with a positive free term. Moreover, the approximation functions for nano- and micro-sized powders differ only in the value of the free term. For nanosized powders, the value of the free term is almost an order of magnitude greater. For numerical estimates, tabular data on the volume of vaporization and the heats of evaporation and condensation of water at normal pressure and a temperature of 100 °C were used.