

THE STUDY OF SENSITIVITY TO IMPACT OF MIXTURES OF AMMONIUM NITRATE WITH ALUMINUM ASD-4

A. V. Dubovik

N. N. Semenov Federal Research Center for Chemical Physics of the Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation

Abstract: The results of drop-weight experiments with impact on pressed charges for mixtures of ammonium nitrate with aluminum middle dispersion ASD-4 brand in the entire range of changes on the concentrations of components are presented. Data processing was performed using the critical pressure method. It is shown that the dependence of initiating pressures on the metal content in the mixture has a characteristic minimum near the stoichiometric composition, the presence of which indicates the chemical interaction of components or products of their primary thermal decomposition in the centers of mechanical heating of charges upon impact. The critical explosion initiation pressures are calculated using two different models: the mechanism of chemical interaction of components in the oxidizer–fuel system and the mechanism of initiation due to friction heating of aluminum solid particles that introduce the reaction into the surrounding explosive. It is established that the experimental data are satisfactorily described by both theoretical approaches, each valid in the field of its significance.

Keywords: explosive; impact; explosion; sensitivity; sensitization

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Figure Caption

Dependences of calculated (I — based on the theory of chemical interaction of components [4]; 2 — based on the theory of frictional heating of solid particles [6]) and experimental (signs) P_{cr} values on the composition of the AN–Al mixture

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Contributors

Dubovik Alexander V. (b. 1938) — Doctor of Science in physics and mathematics, professor, leading research scientist, N. N. Semenov Federal Research Center for Chemical Physics of the Russian Academy of Sciences, 4 Kosygin Str., Moscow 119991, Russian Federation; a-dubovik@mail.ru