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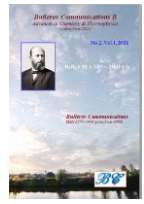

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Kinetic and mass-energy aspects of detonation production of nanodiamonds

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Abstract

There are Kinetic and mass-energy aspects of a detonation, example of using mixed explosives *(HEs)*, including under industrial synthesis conditions are considered. The phase composition, microstructure and granularity of the primary products of synthesis and enrichment of nanodiamonds *(ND)* were determined. It was found that the emergence and growth of the micro crystals finishes in the zone of chemical reactions on a stage of detonation synthesis. The rest of carbon structures continue their growth in Taylor's wave. Under equal experimental conditions, when the mass of the explosive changes from 0.1 to 2.0 kg, the sizes of microcrystallites do not change. *ND* with microcrystallite sizes in the range of 1.25-32.4 nm were obtained in the experiments. The larger the microcrystallites, the larger the crystalline phase and the lower the microdistortions of the crystal lattice of *ND*. Fullerenes and carbon diamond-like structures with microcrystallite sizes are found to be larger than for the diamond. The sizes of microcrystallites for industrial-synthesized diamonds, both from carbon, molecules of explosives, and from explosives with graphite are approximately equal, and the grain size differs by an order of magnitude. The last case shows the diamond particles are polycrystals. It was found that in the process of high-temperature enrichment of *ND* from condensed synthesis products, the sizes of microcrystallites and grains increase, and the more, the higher the temperature of the process. The obtained results are significant for the technology of obtaining detonation nanodiamonds. The formation and

growth of *ND* crystals begins at the stage of synthesis and continues at the stage of enrichment, and the contribution of the second stage may be more significant.

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