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# Crystal Lattice Free Volume in a Study of Initiation Reactivity of Nitramines: Friction Sensitivity.

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## Abstract

The relationship between friction sensitivity (FS) and the crystal lattice free space per molecule,  $\Delta V$ , of thirteen nitramines is described by a linear equation, divided into a number of the partial relationships with strong limitations by their molecular structure characteristics. Increasing FS due to raising of the  $\Delta V$  values is not clearly confirmed. The influence of the  $\Delta V$  values on friction sensitivity of nitramines is similar to that of their aza atoms which influence the mutual orientations of nitro groups in neighboring molecules. The dipole-dipole interaction of the oxygen and nitrogen atoms of nitro groups in neighboring nitramine molecules has a major effect on their own FS. In accordance with this interaction, a directly proportional relationship was derived between FS and the intrinsic gas phase molecular volume,  $V_{int}$ , of the nitramines mentioned, which is divided also into several straight lines according to relatively tight molecular structure similarity. The relationships found again confirm a level of disorder in the distribution of the forces in the crystal lattice of the "common" quality of  $\epsilon$ -2,4,6,8,10,12-hexanitro-2,4,6,8,10,12-hexaazaisowurtzitane, in comparison with its reduced sensitivity (RS) or chemically pure analogue.

**Keywords:** Crystal lattice; Friction; Initiation reactivity; Nitramines;

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