DETERMINATION OF SHOCK COMPRESSION CONDITIONS FOR POROUS NIAL SAMPLES BELOW THE MELTING CURVE

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The effect of additives of concentrated (99.5 %) nitric acid (NA) on the detonation velocity and the structure of detonation waves in a liquid explosive tetranitromethane (TNM) was studied using optical fibers (time markers), VISAR laser interferometer and ultra-speed photochronograph. It has been shown that even relatively small concentrations of NA (5 wt. %), when initiated in a glass tube with an inner diameter of 28 mm and a plexiglass tube with a diameter of 36 mm and a length of 4-5 diameters, detonation is attenuated, given that the critical diameter of TNM in a glass tube is approximately 11 mm [1]. The failure waves on the side wall are not recorded. Instead, the photochronograms show a smooth convergence of the glow to the center, which, however, does not have time to complete due to the release of detonation onto the free surface of the mixture. With 10% of acid in a plexiglass tube with a diameter of 36 mm, convergence manages to occur, and the shock wave upon reaching a free surface turns out to be so weak that it does not lead to air glow. The results obtained indicate a marked increase in the critical diameter at low concentrations of NA. Determination of the detonation velocity and the registration of the surface velocity of the mixture-water window using VISAR for pure TNM and its mixtures with 10 and 20 wt. % of NA were produced in short tubes with a large diameter (56 mm) and a length of 20 mm. This experimental setup corresponds to an infinite charge diameter, since information from the tube wall does not have time to reach the center during registration. Initiation was performed using a charge of pressed TNT of the density slightly less than the maximum through the Teflon plate 10 mm thick. It is shown that at a distance of more than 12 mm from the plate, the detonation velocity for all compounds manages to establish itself. As the concentration of NA increases, the detonation velocity decreases linearly from 6.4 for pure TNM to 5.5 km/s for a mixture with 20% of NA. At the same time, an increase in the concentration of NA, despite its strong effect on the critical diameter, does not lead to the appearance of heterogeneity on the detonation front.

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References

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