

Synthesis of 2-Methyl-2-nitro-1,3-diazido-propane

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Abstract: 2-Methyl-2-nitro-1,3-diazidopropane (NMPA) can be used as a low-molecular plasticizer of propellants and as an ingredient of gas generators. NMPA was mentioned in literatures, but its detailed synthesis procedures were not reported. The authors synthesized NMPA via a self-designing process that consists of three steps, i. e. condensation, sulfonation and azido-substitution, using nitroethane and formaldehyde as starting materials. The factors affecting the NMPA's yield, including reaction temperature, time and media for azido-substitution, were investigated. Based on this investigation, the optimal reaction conditions were determined: $T=93 \sim 95 \text{ }^\circ\text{C}$, $t=30 \text{ h}$, medium DMSO, which made NMPA's yield (based on nitroethane) up to 71.5% and purity of 99%. The structure of the resulting product was identified by IR, NMR and element analysis. Some properties of NMPA were measured as follows: $\rho 1.28 \text{ g} \cdot \text{cm}^{-3}$, T_g (DSC) $-51.5 \text{ }^\circ\text{C}$, T_p (DSC) $234 \text{ }^\circ\text{C}$, impact sensitivity 34 cm, friction sensitivity 32%.

Key words: organic chemistry; 2-methyl-2-nitro-1,3-diazido-propane (NMPA); azido

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