1H-1,2,3-triazole (C$_s$; $\kappa = 0.94$; $\mu_a = 4.1$ D, $\mu_b = 1.6$ D) and 2H-1,2,3-triazole (C$_{2v}$; $\kappa = 0.82$; $\mu_b = 0.52$ D) are tautomers (C$_2$H$_3$N$_3$), the former of which is formally the product of a 1,3-dipolar cycloaddition of two explosive compounds, hydrazoic acid and acetylene. We have analyzed the rotational spectra of these tautomers in the 130 – 360 GHz frequency range and least-squares fit the observed transitions to sextic Hamiltonians with low error ($\sigma < 50$ kHz). While $^{13}$C and $^{15}$N isotopologues have been observed at natural abundance and similarly analyzed, several synthetic techniques had to be employed to access deuterium-substituted isotopologues. The rotational constants of the numerous isotopologues, along with vibration-rotation interaction and electron mass corrections predicted using coupled-cluster and density functional theories, have been used to determine highly precise semi-experimental equilibrium structures ($r_e^{SE}$) of the 1,2,3-triazoles. Equilibrium structures calculated at the above-mentioned levels of theory, as well as a computational prediction using basis set extrapolation and additional corrections for the 2H structure, are compared to the semi-experimental structures.