Fulvenallene (C$_7$H$_6$) and the fulvenallenyl (C$_7$H$_5$) radical are produced via thermal dissociation of phthalide in a continuous-wave SiC pyrolysis furnace. Prompt pick-up and solvation by helium droplets allow for well-resolved vibrational spectra of these species in the CH stretching region. The acetylenic CH stretch of the fulvenallenyl radical is a sensitive marker of the extent by which the unpaired electron is delocalized throughout the conjugated propargyl and cyclopentadienyl subunits. The nature of this electron delocalization is explored with spin density calculations at the CCSD(T)/ANO1 level of theory.