Carbacylamidophosphates: Synthesis and Structure of 
N,N'-Tetramethyl-N''-p-chlorobenzoylphosphoryltriamide 
and N,N'-Tetramethyl-N''-o-fluorobenzoylphosphoryltriamide

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N,N'-Tetramethyl-N''-p-chlorobenzoylphosphoryltriamide (I), N,N'-tetramethyl-N''-o-fluorobenzoylphosphoryltriamide (II) and their sodium salts were synthesized and characterized by means of IR and $^{1}H$, $^{31}P$ NMR spectroscopy. The structures of both compounds were determined by X-ray diffraction (I triclinic, space group $\overline{P}$1 with $a = 12.073(2)$, $b = 12.869(3)$, $c = 12.854(4)$ Å, $\alpha = 56.93(2)$, $\beta = 62.45(2)$, $\gamma = 66.34(2)$°, $V = 1453.7(6) \text{Å}^3$, $\rho(\text{calcld.}) = 1.324 \text{mg/cm}^3$, $Z = 4$ and $R = 0.0545$, $wR = 0.1425$; II monoclinic, space group $P2(1)/n$ with $a = 10.051(2)$, $b = 13.093(2)$, $c = 10.856(2)$ Å, $\beta = 108.36(2)$°, $V = 1355.9(4) \text{Å}^3$, $\rho(\text{calcld.}) = 1.339 \text{mg/cm}^3$, $Z = 4$ and $R = 0.0533$, $wR = 0.1263$). In both structures the molecules are associated into dimers via hydrogen bonds formed by the phosphorylic oxygen atoms and hydrogen atoms of amide groups. In I the unit cell consists of two independent molecules connected into non-symmetric dimers, in II of centrosymmetric dimer molecules.