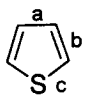
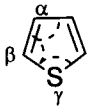
Thiophene, a planar aromatic compound, has bond angles and lengths that are affected even more so than furan by the large atomic radius of the sulfur atom. This is evidenced by observing the length of the C–S bonds and the exaggerated bond angle.



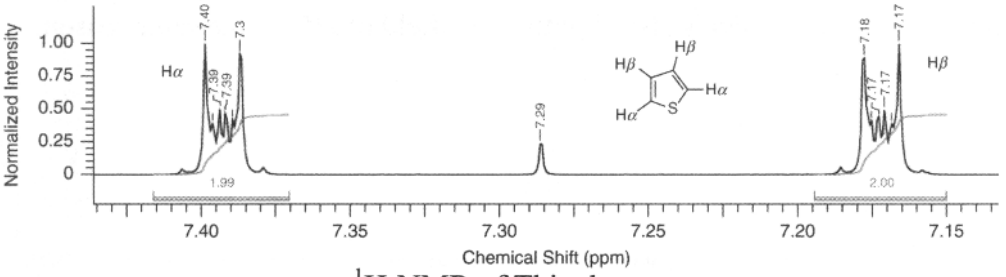
a = 1.41 Å
b = 1.34 Å
c = 1.70 Å



α = 114°
β = 109°
γ = 93°

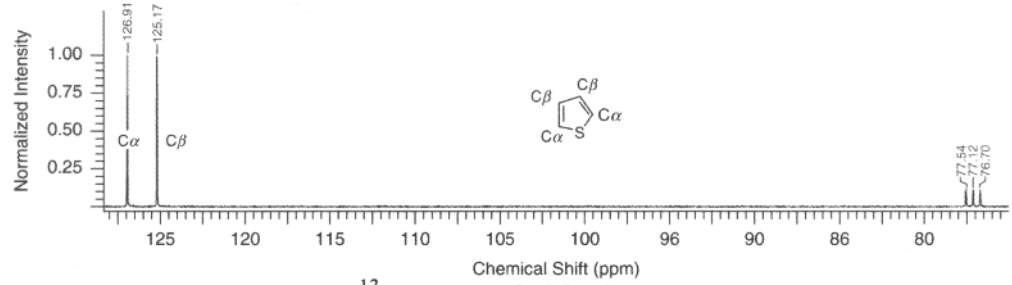
Bond Lengths and Angles of Thiophene

The ^{1}H-NMR of thiophene has two distinct peaks corresponding to the two separate sets of nonequivalent hydrogen atoms in the ring system. The two α-protons (adjacent to the sulfur) are deshielded by the inductive effect of the sulfur atom and can be found at 7.39 ppm. The two β-protons are further upfield (effectively less deshielded than their α-protons neighbors) at 7.17 ppm.



^{1}H-NMR of Thiophene

The ^{13}C-NMR of thiophene provides a predictable spectrum with the α-carbons found further downfield (126.9 ppm) than the β-carbons (125.1 ppm) in the aromatic region; again, these patterns are largely the result of the inductive effect of the sulfur.



^{13}C-NMR of Thiophene