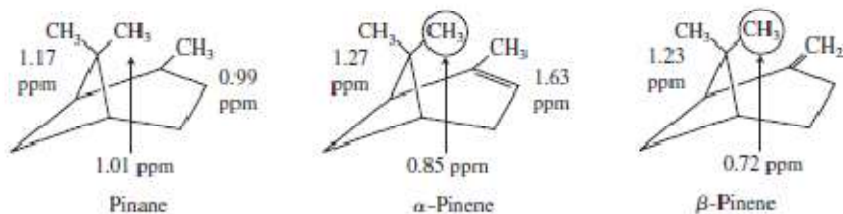


(1) What are the allowed nuclear spin states for the following atoms?

(a) ^{14}N (b) ^{13}C (c) ^{17}O (d) ^{19}F

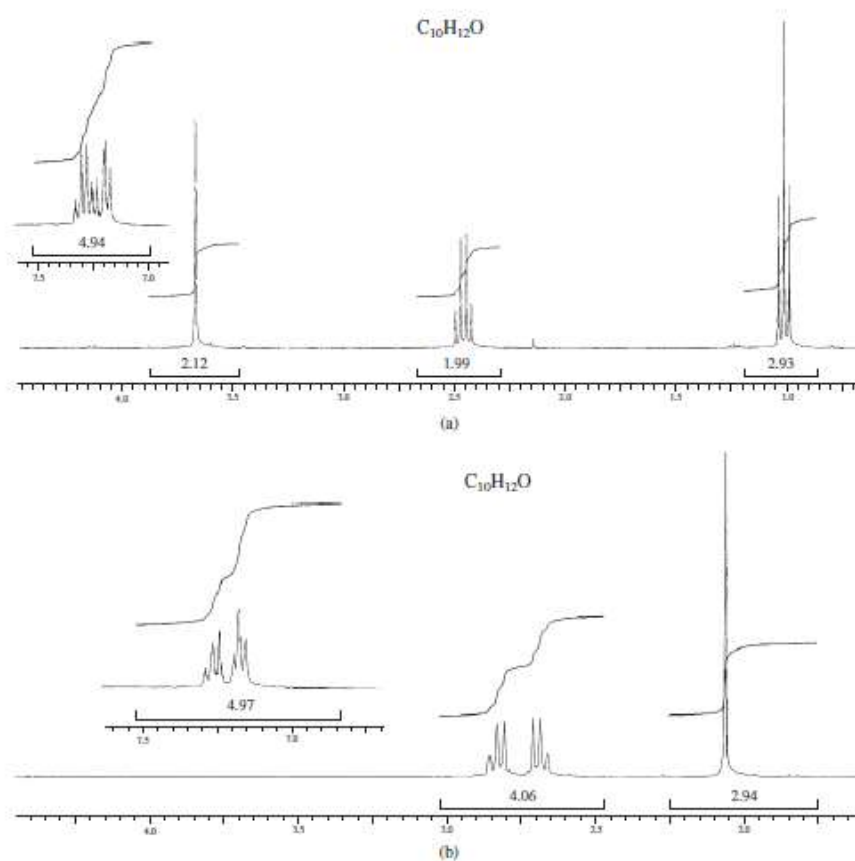
(2)

*6. The chemical shifts of the methyl groups of three related molecules, pinane, α -pinene, and β -pinene, follow.



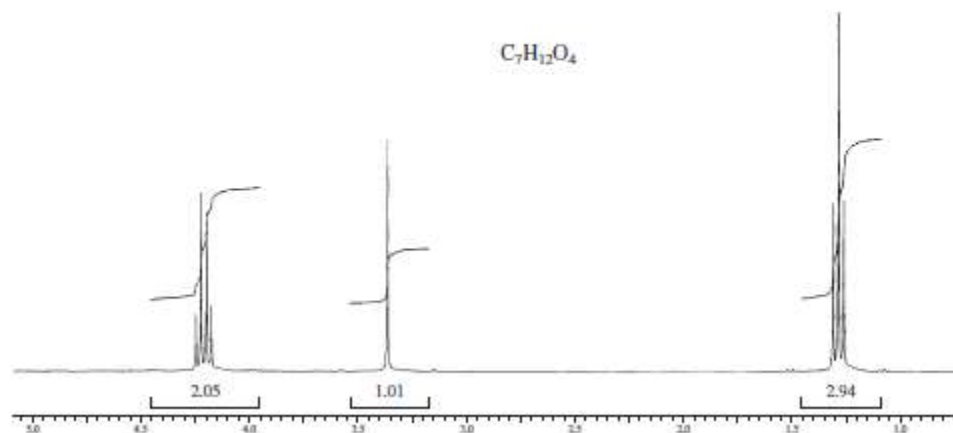
(3)

22. The NMR spectra are shown for two isomeric compounds with formula $\text{C}_{10}\text{H}_{12}\text{O}$. Their infrared spectra show strong bands near 1715 cm^{-1} . Make no attempt to interpret the aromatic proton area between 7.1 and 7.4 ppm except to determine the number of protons attached to the aromatic ring. Draw the structure of the compounds.



(4)

26. The NMR spectrum is shown for a compound with formula $C_7H_{12}O_4$. The infrared spectrum has strong absorption at 1740 cm^{-1} and has several strong bands in the range 1333 to 1035 cm^{-1} . Draw the structure of this compound.



(5) Why coconut oil have higher melting point than sunflower oil?

(6) Why cyanides are highly toxic for human beings?