C_4H_8O

δ 2.449, q, 2H
δ 2.34, s, 3H
δ 1.058, t, 3H

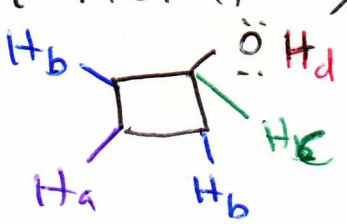
Degree of unsaturation

$$D.O.U = \frac{[2C+2+N-X]-H}{2}$$

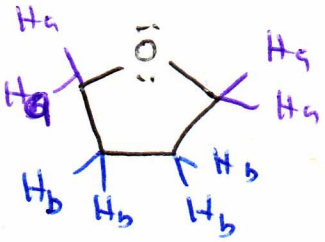
max # of H possible given # of C

total adjusted for heteroatoms

1 D.O.U. → must have a ring or C=C or C=O



4 signals

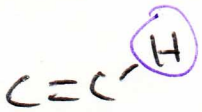


2 signals

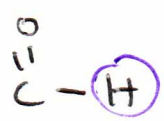
- If a ring is present, there can be no C=C or C=O, since there is only 1 D.O.U.

These are incorrect structures for this example since the # of signals does not match.

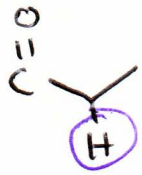
- If the compound doesn't have a ring, it must have a C=C or C=O



δ 4.6-5.9



δ 9-10



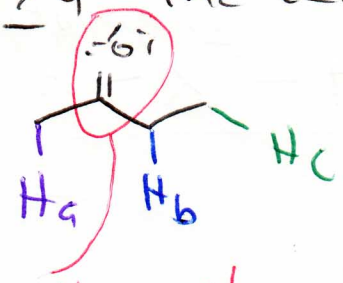
δ 2.0-2.7

It is possible to have an alkene without seeing alkene hydrogens:

Requires 6 carbons

Since this compound does not have enough carbons for the above exception, and since there are no hydrogens w/ the appropriate δ, the compound does not have C=C, which, if it also does not have a ring, it must have a C=O since it has a D.O.U.

Since there is not peak w/ $\delta \geq 9$ the C=O must be part of a ketone ⟶



[2

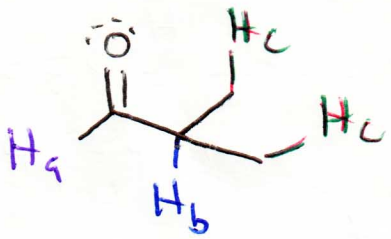
H_b • δ 2.449, q, 2H
H_a • δ 2.34, 5, 3H
H_c • δ 1.058, t, 3H

no H on the C=O, so C=O blocks splitting between neighbors

C_4H_8O δ 9.57, d, 1H — doublet of heptets
δ 2.39, dhept, 1H
δ 1.06, d, 6H

↳ The only ~~time~~ way integration can be greater than 3 is if there are multiple chemically-equivalent ~~hy~~ carbons.

- Since there is one D.O.U. and there is a peak w $\delta \geq 9$, the compound is an aldehyde,



- δ 9.57, d, 1H
- δ 2.39, dhept, 1H
- δ 1.06, d, 6H

Since the aldehyde hydrogen was split into a doublet, it ~~only~~ has exactly one and only one neighboring hydrogen, which means the other two atoms @ the neighbor position must be carbons.

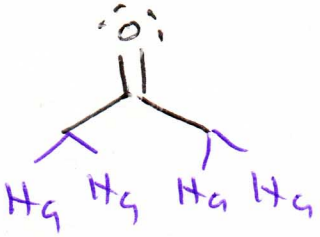
$C_6H_{10}O$ ⟶

δ 2.55, t, 4H
δ 2.05, tt, 4H
δ 1.06, quintet, 2H

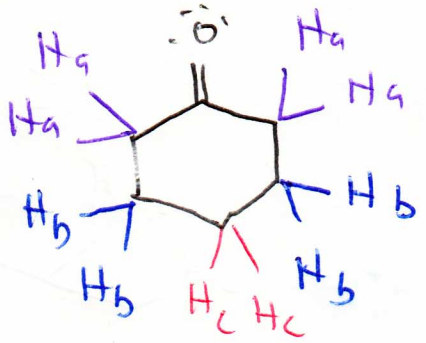
2 D.O.U:
- 2 rings
- C=O + ring
- C=O + C=C
- C=C + ring
- 2 C=C
- C≡C

Based on δ
(nothing δ ≥ 9)
(nothing 4.6 ≤ δ ≤ 5.9)
(is 2.0 ≤ δ ≤ 2.7)

Guess that it is a ketone



Since the hydrogen next to C=O integrates to 4, the C=O must be completely symmetric.



$DØ !! $DØ; try
try - command not found

- δ 2.55, t, 4H
- δ 2.05, tt, 4H
- δ 1.06, quintet, 2H