π/12 $C_4H_{10}O$

δ 3.337, s, 3H
δ 3.336, t, 2H
δ 1.59, tq, 2H
δ 0.93, t, 3H

C_8H_8 — 11

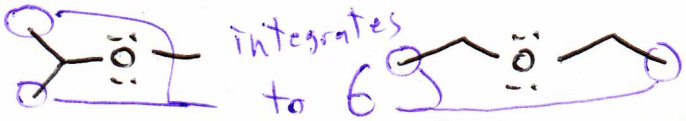
δ 7.10–7.5, m, 5H
δ 6.692, dd, 1H, J_1 = 7 Hz, J_2 = 12 Hz
δ 5.737, dd, 1H, J_1 = 2 Hz, J_2 = 12 Hz
δ 5.225, dd, 1H, J_1 = 2 Hz, J_2 = 7 Hz

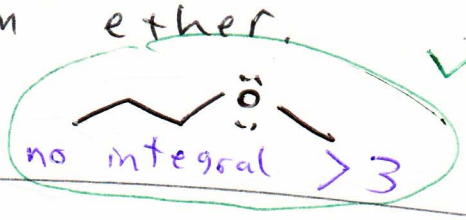
* no rings!

Method 1: D.O.U + Integration

D.O.U = 0 ⟶ must be an alcohol or ether*

Since there is only one oxygen and no peak integrates to one, the compound is an ether.





Alcohols δ 4.5–9

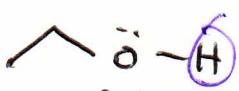
At room temperature, alcohols undergo rapid proton exchange (dissociation + reassociation).

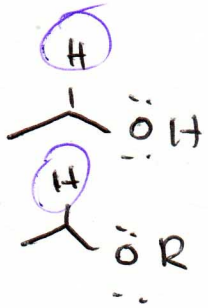
– If D_2O is added to a sample, proton/deuterium exchange can occur, which, if sufficient D_2O is added, can convert an alcohol to its deuterated analog.

Since H + D are different nuclei, they absorb NMR radiation @ different frequencies, so when conducting ^1H-NMR, the alcohol peak (after exchange) disappears.

– At RT, proton exchange is rapid enough that splitting between an alcohol proton and it's neighbors will not be observed.

Method 2: δ

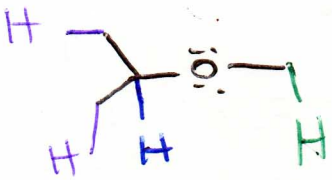




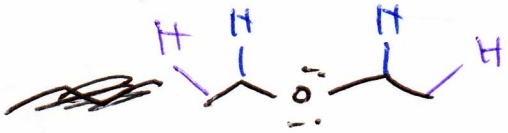
3.3–4.0

1.2

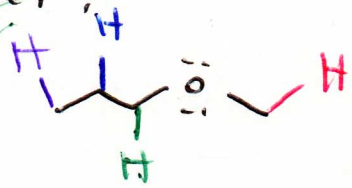
This compound has <u>two</u> peaks with $\delta \sim 3.4$, with a combined integration > 3. This must mean there are two carbons next to the only oxygen present, so the compound is an ether.



3 signals



2 signals

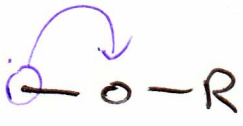


4 signals

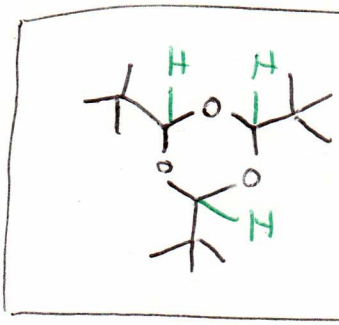
Method 3: Splitting

A singlet that has an integration of 3 often indicates there is a methyl group with blocked splitting.

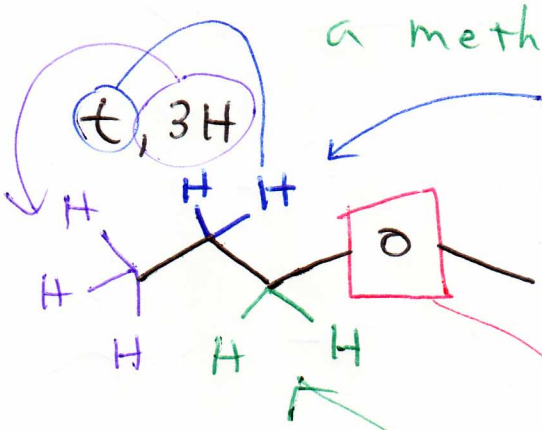
blocked (no H on neighbor)



It is a reasonable guess that the compound is a methyl ether,



must at least be a quarted due to the methyl group



→ T q, 2H

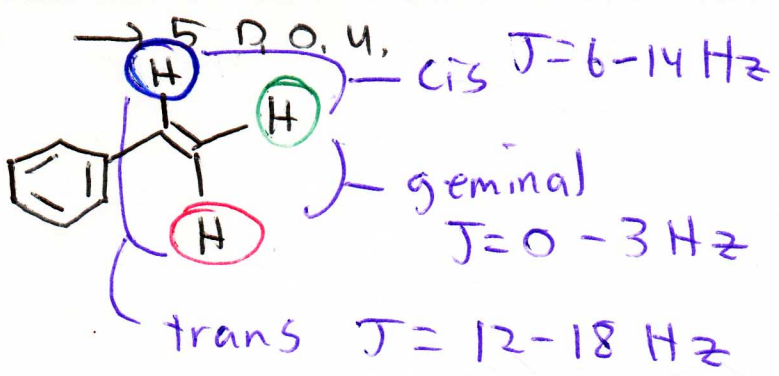
two different neighbors

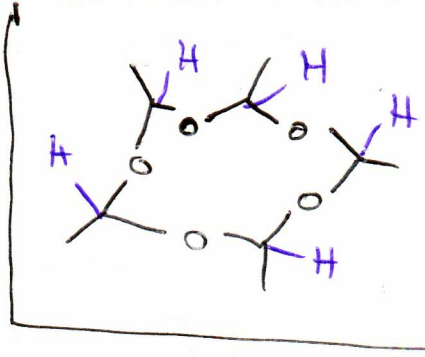
Only one other peak has an integration of 2:

→ t, 2H

Since it is only a triplet, there cannot be any other neighboring hydrogens

C_8H_8





- δ 6.692, J = 7 Hz, 12 Hz ← not geminal
- δ 5.737, J = 2 Hz, 12 Hz trans
- δ 5.225, J = 2 Hz, 7 Hz cis

geminal

C_5H_8O

δ 6.342, d, 1H, J = 6.2 Hz
δ 4.664, dt, 1H, J = 6.2 Hz
δ 3.957, t, 2H
δ 1.984, dt, 2H
δ 1.846, tt, 2H

C_6H_{12}

δ 5.45, dt, 1H, J = 14 Hz
δ 5.42, dq, 1H, J = 14 Hz
δ 1.95, dt, 2H
δ 1.643, d, 3H
δ 1.360, Tq, 2H
δ 0.889, T, 3H