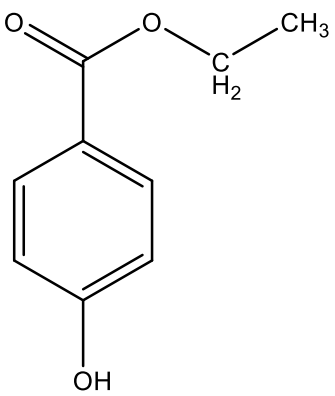
Answer on Question #81464 – Chemistry – Organic Chemistry

Task:

Provide a structure for the following compound: $C_9H_{10}O_3$; IR: 2400–3200, 1700, 1630 cm^{-1}; 1H NMR: δ 1.53 (3H, t, J = 8 Hz); δ 4.32 (2H, q, J = 8 Hz); δ 7.08, δ 8.13 (4H, pair of leaning doublets, J = 10 Hz); δ 10 (1H, broad, disappears with D2O shake).

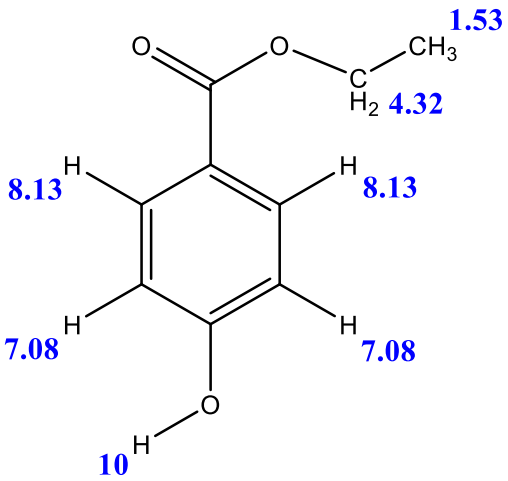
Solution:

Structure for the compound, $C_9H_{10}O_3$:



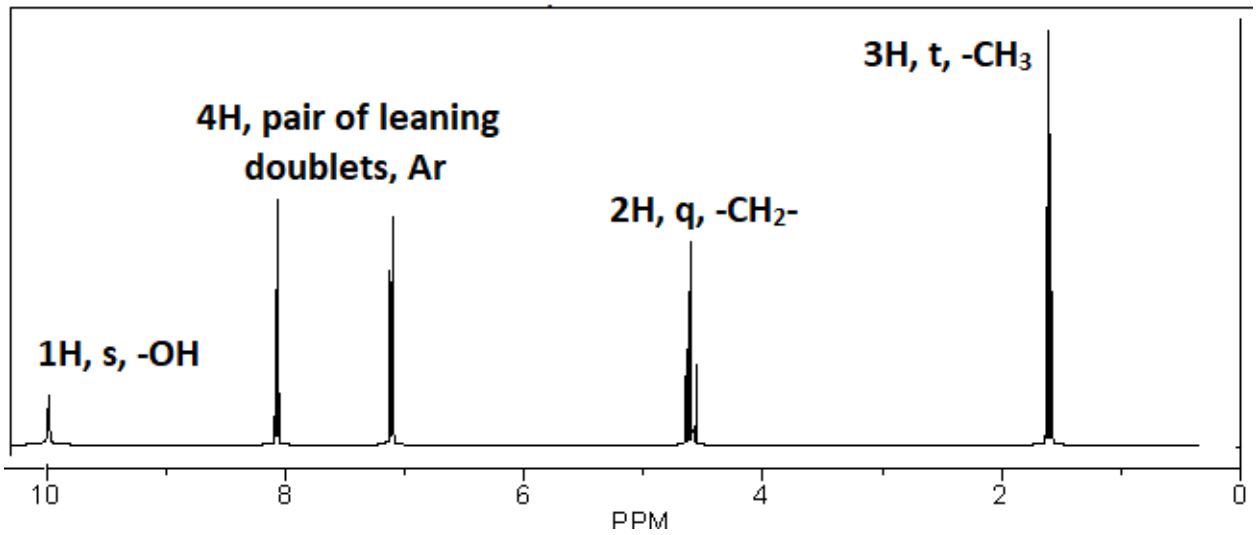
ethyl 4-hydroxybenzoate

^{1}H NMR: δ 1.53 (3H, t, J = 8 Hz); δ 4.32 (2H, q, J = 8 Hz); δ 7.08, δ 8.13 (4H, pair of leaning doublets, J = 10 Hz); δ 10 (1H, broad, disappears with D2O shake).



If a drop of D2O is added to the NMR sample tube and the tube is shaken, the OH protons rapidly exchange with the protons of D2O to form OD groups on the alcohol. As a result, the OH resonance disappears when the spectrum is rerun.

Schematic ^{1}H NMR spectrum of $C_9H_{10}O_3$:



IR: 2400–3200, 1700, 1630 cm^{-1}

1700 cm^{-1} : C=O stretch

1630 cm^{-1} : C=C stretch

2400–3200 cm^{-1} : =C-H stretch

The =C–H stretch in aromatics is observed at 3100-3000 cm^{-1}

Aromatic hydrocarbons show absorptions in the regions 1700-1585 cm^{-1} and

1500-1400 cm^{-1} due to carbon-carbon stretching vibrations in the aromatic ring

For aromatics:

- C–H stretch from 3100-3000 cm^{-1}
- overtones, weak, from 2000-1665 cm^{-1}
- C–C stretch (in-ring) from 1600-1585 cm^{-1}
- C–C stretch (in-ring) from 1500-1400 cm^{-1}
- C–H "oop" from 900-675 cm^{-1}