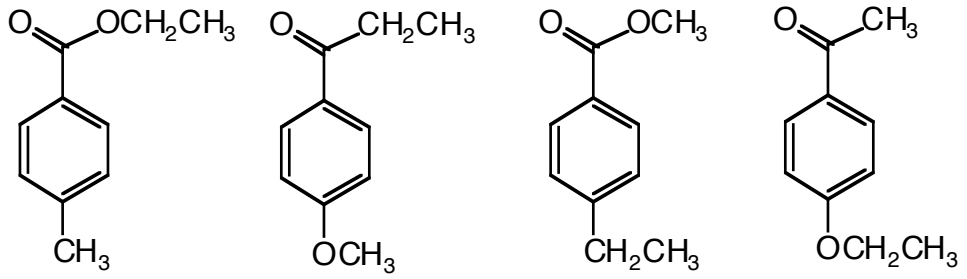
Problem 80, Chemistry 301X-2006

You have four bottles, each containing one of the four compounds shown below, **E**, **F**, **G**, and **H**. From the spectral data given, determine which bottle holds which compound.




**E** **F** **G** **H**

All compounds have signals in the aromatic region of the NMR for 4H, so that information is of no use.

Bottle 1: IR 1720 $cm^{-1}$ $^1H$ NMR: $\delta$ 1.38 (t, 3H), 2.40 (s, 3H), 4.36 (q, 2H)

Bottle 2: IR 1688, $cm^{-1}$ $^1H$ NMR: $\delta$ 1.12 (t, 3H), 2.81 (q, 2H), 3.76 (s, 3H)

Bottle 3: IR 1725 $cm^{-1}$ $^1H$ NMR: $\delta$ 1.21 (t, 3H), 2.65 (q, 2H), 3.85 (s, 3H)

Bottle 4: IR 1680 $cm^{-1}$ $^1H$ NMR: $\delta$ 1.40 (t, 3H), 2.50 (s, 3H), 4.07 (q, 2H)