Worksheet: Separation and Identification of Unknowns

1. The following two organic compounds shown below are dissolved in t-butyl methyl ether.

\[
\begin{align*}
&1 \quad \text{H} & \quad 2 \\
&\text{N} & \quad \text{O}
\end{align*}
\]

How might you separate the two compounds above using an extraction procedure similar to what you did in lab? Hint: Compound 1 is not soluble in water, but when 1 is treated with HCl, a water soluble compound is formed. Draw out the reaction described and explain how you would separate compounds 1 and 2.

Reaction of 1 with HCl:

2. In the determination of an unknown, Ben Zeen collected the following data for a liquid unknown.

a. A boiling point of 80-85°C.
b. An intense absorbance in the IR at about 3400 cm\(^{-1}\) (broad) and at 2970 cm\(^{-1}\) (sharp).
c. Only two peaks in the \(^{13}\text{C} \text{NMR}\)
d. Only three peaks in the \(^1\text{H} \text{NMR}\), a broad singlet, a septet, and a doublet in the ratio of 1:1:6

What is Ben’s unknown?