Week 9 Practical Review Problems

1. A TLC plate is spotted with the following compounds.

2. What can you conclude about the spotted compounds based on these plates? Do you notice any issues with the way the plates were prepared?
3. Chelsea and Jorge are analyzing the following reaction with TLC to determine if it has gone to completion.

\[
\begin{align*}
\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} + \text{KOTBu} &\rightarrow \text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2 \\
\end{align*}
\]

In their TLC analysis, they spotted lane 1 with reactant and lane 2 with their obtained product using a 1:1 hexanes:ethyl acetate solvent. Their plate showed that lane 2 had a noticeably higher spot than lane 1. Chelsea thinks that this means the reaction was successful because the product would be expected to elute higher. Jorge disagrees, saying that there must be significant unreacted starting material because polar compounds would move higher on a polar plate.

Who is correct, and why?

4. What is one way to confirm that the reaction in question 3 has gone to completion?

5. In each scenario, which layer will be on top in the sep funnel?

a. Organic Solvent: dichloromethane (density = 1.33g/ml) and water
b. Organic solvent: diethyl ether (density = 0.706g/ml) and water
6. How would you determine which layer is your aqueous layer and which is your organic layer in the sep funnel if you mix them up?

7. What is the purpose of the drying agent?

A) Add to the aqueous layer to remove any water contamination
B) Add to the organic layer to remove any water contamination
C) Add to the aqueous layer to remove contamination by organic product
D) Add to both layers to remove excess acid or base

8. Which of the following pairs of compounds can be separated by acid-base extraction, and which one would you need to add?

a)

b)

c)
9. Which base is most appropriate to separate these 2 acids?

\[
\begin{align*}
\text{pKa} &\sim 5 \\
\text{pKa} &\sim 10
\end{align*}
\]

a) \( \text{OH}^- \) \((\text{pK}_b\sim0)\)

b) \( \text{CH}_3\text{CO}_3^- \) \((\text{pK}_b\sim6)\)

10. You are asked to determine the identity of a compound as compared to a set of standards during an organic chem practical. Seeing that you don’t have much time left, you turn up the RAMP rate on the DigitMelt. The melting point of your product was 121 - 125 °C and the melting point of the final standard (Standard A) you are testing is 119 °C. You figure it is close enough, and claim that your product is the same compound as Standard A. Can you make this claim? Explain.
Spectroscopy Review Problem

1. Determine the structure of the compound with the following formula based on the NMR and IR spectra.

\[ \text{C}_7\text{H}_8\text{O}_2 \]