Experiment 5: Column Chromatography

Appendix C: Questions

Answers to questions should be typed and submitted in Appendix C of your Lab Report. Hand written answers will not be graded. Supporting figures, if any, may be neatly hand drawn.

1. Acetylferrocene (2) is prepared from ferrocene (1) by the following reaction. Under harsh condition, further reaction can occur, giving 1,1'-diacetylferrocene (3).

\[
\begin{array}{ccc}
\text{Fe} & \text{O} & \text{O} \\
\text{85% H}_3\text{PO}_4 & \rightarrow & \text{Fe} \\
1 & 2 & + \\
\end{array}
\]

a. In what order (first to last) will compounds 2 and 3 come off the column?

**Compound 2 will come off first, followed by compound 3.**

b. Draw a TLC plate that shows the relative location of each compound when the plate is developed (assume a solvent system is used that will move each of the spots some distance up the plate). Be sure to label your spots appropriately.

![TLC plate diagram]

1 2 3

c. The original column is run using 25% ethyl acetate hexanes. How would the order of elution change if a less polar solvent was used? Assume all compounds can still be cleanly separated.

**The order of elution will not change if a less polar solvent is used.**

3. A mixture of compounds (below) is separated by column chromatography. How can IR be used to identify each component? For full credit, note key absorptions that you would expect to see for each compound. Be specific. Cite numerical values/ranges to support your answer.

![Compounds A and B]

A: carboxylic acid - OH absorbance between 2400-3600 cm\(^{-1}\) and C=O absorbance between 1700-1730 cm\(^{-1}\)

B: ketone - C=O absorbance between 1695-1740 cm\(^{-1}\)