Quiz #6

1. Please provide the major product for each. (4pts)

2. Why do we reflux the reaction pot? What rate principle is in effect here? (4pts)
Because the reaction is very slow even if a catalyst is present, the reaction mixture has to be heated to obtain a reasonable yield in the allotted time. The Arrhenius equation exhibits the rate principle in effect: \( \text{rate} = ke^{-\Delta \text{G}/RT} \). The rate of reaction increases by a factor of 1000.

3. Since this reaction is an equilibrium reaction with a relative small equilibrium constant, how can we take advantage of Le Châtelier’s Principle to increase the yield? (4pts)
Add an excess of the alcohol to push the equilibrium to the right.

4. What are the following substances used for in the experiment today: (4pts)
a. Sodium Bicarbonate: extraction
b. Sodium Sulfate: drying agent

5. A student observes a refractive index of \( n_D = 1.4040 \) for his compound at 24.5°C. Calculate the refractive index at 20°C. (2pts)
\[
\begin{align*}
n_D^X &= n_D^T + (T-X) \times 0.00045 \\
n_D^{20} &= 1.4040 + (24.5 - 20) \times 0.00045 = 1.4060
\end{align*}
\]

6. Why are we performing a vacuum distillation instead of a normal distillation? (2pts)
The ester decomposes at its normal boiling point temperature. In order to distill the ester without decomposing it, we need to reduce the pressure.