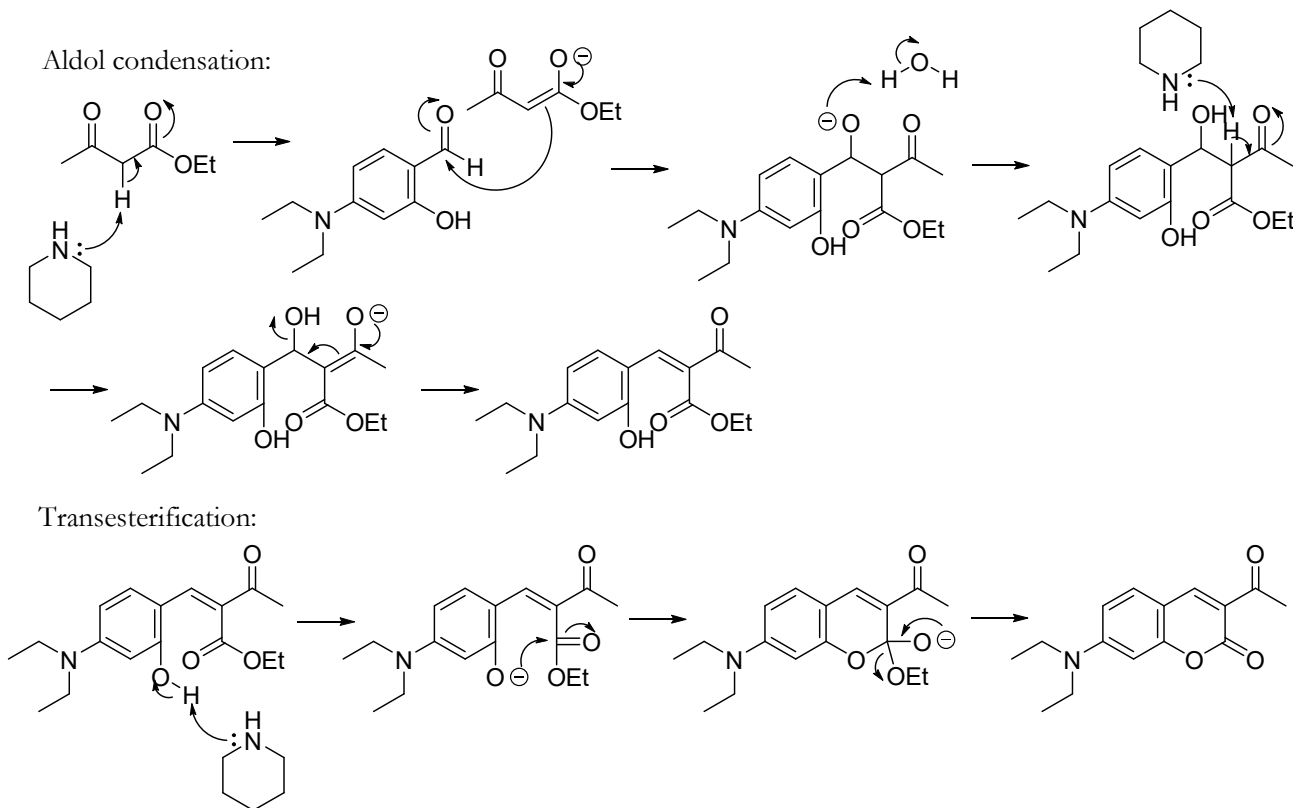


# Experiment 40

## Coumarin Dyes: The Knoevenagel and Pechmann Condensations

### Study Questions

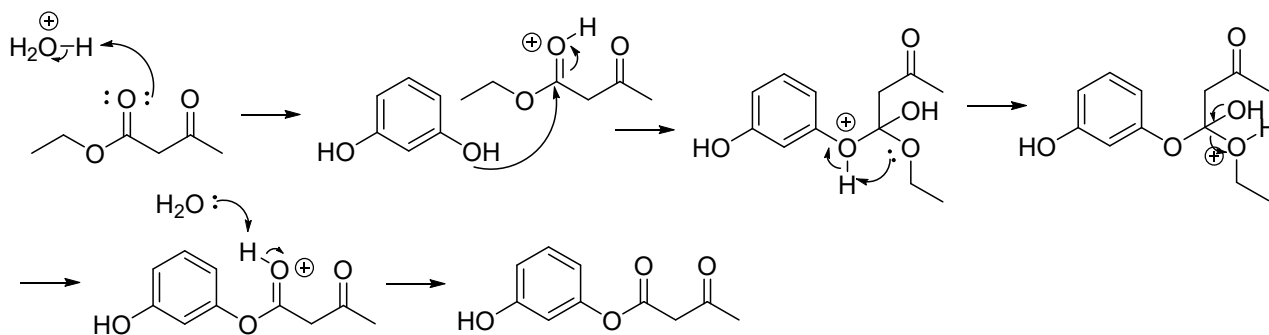
- 1) Propose a complete, curved-arrow mechanism for the Knoevenagel condensation you (or your partner) will perform in this lab. **Answer:**



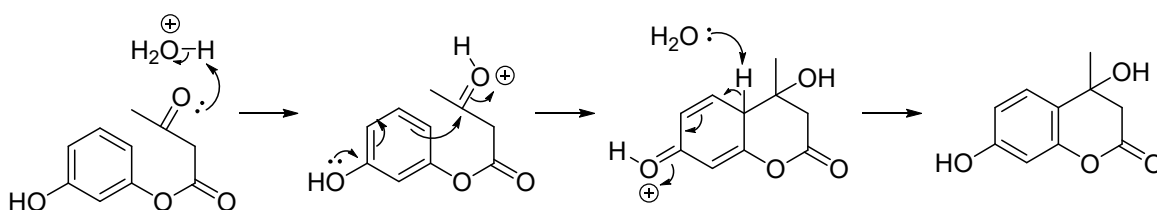
- 2) Propose a complete, curved-arrow mechanism for the Pechmann condensation you (or your partner) will perform in this lab. **Answer:**

## Experiment 40: Coumarin Dyes

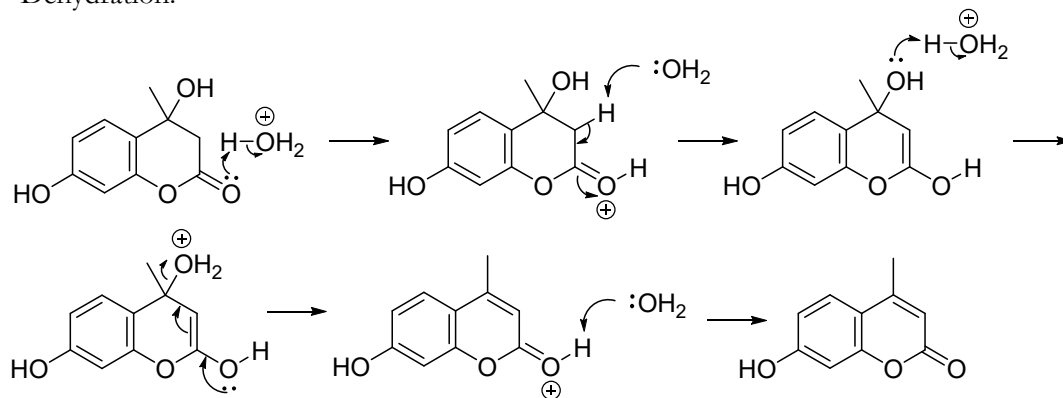
Transesterification:



Electrophilic aromatic substitution:



Dehydration:



- 3) Would you expect 1,3,5-trihydroxybenzene (phloroglucinol) to undergo the Pechmann condensation more quickly or more slowly than resorcinol? Why? **Answer:** It should undergo Pechmann condensation more quickly, since it has three hydroxyl groups. This means that the electrophilic aromatic substitution step should be faster, since OH is an activating group.
- 4) The structure of 4-methylumbelliferone can change slightly under basic or acidic conditions, depending on whether it is protonated or deprotonated. Draw the structure under each of these conditions, and show all significant resonance structures. **Answer:**

