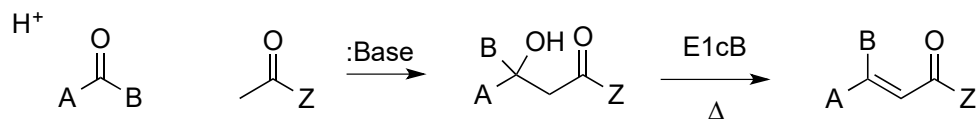


CHEM 110L, Lecture 2Exp 2 – Perkin Condensation: Synthesis of *trans*-cinnamic acid

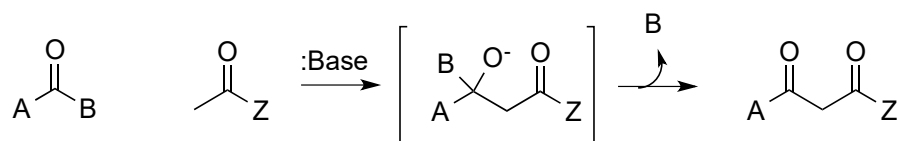
Spectroscopy Review

CARBONYL CONDENSATION REACTIONS

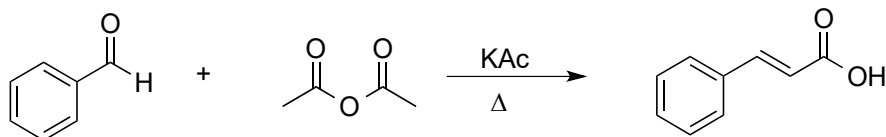
- **Aldol:** aldehydes & ketones (nucleophilic addition)



- **Claisen:** esters (nucleophilic acyl substitution)

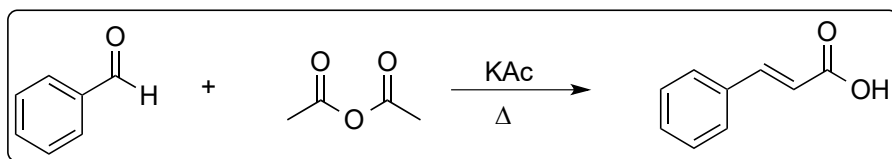


- **Perkin:** anhydride + aromatic aldehyde
Synthesis of *trans*-cinnamic acid via Perkin condensation

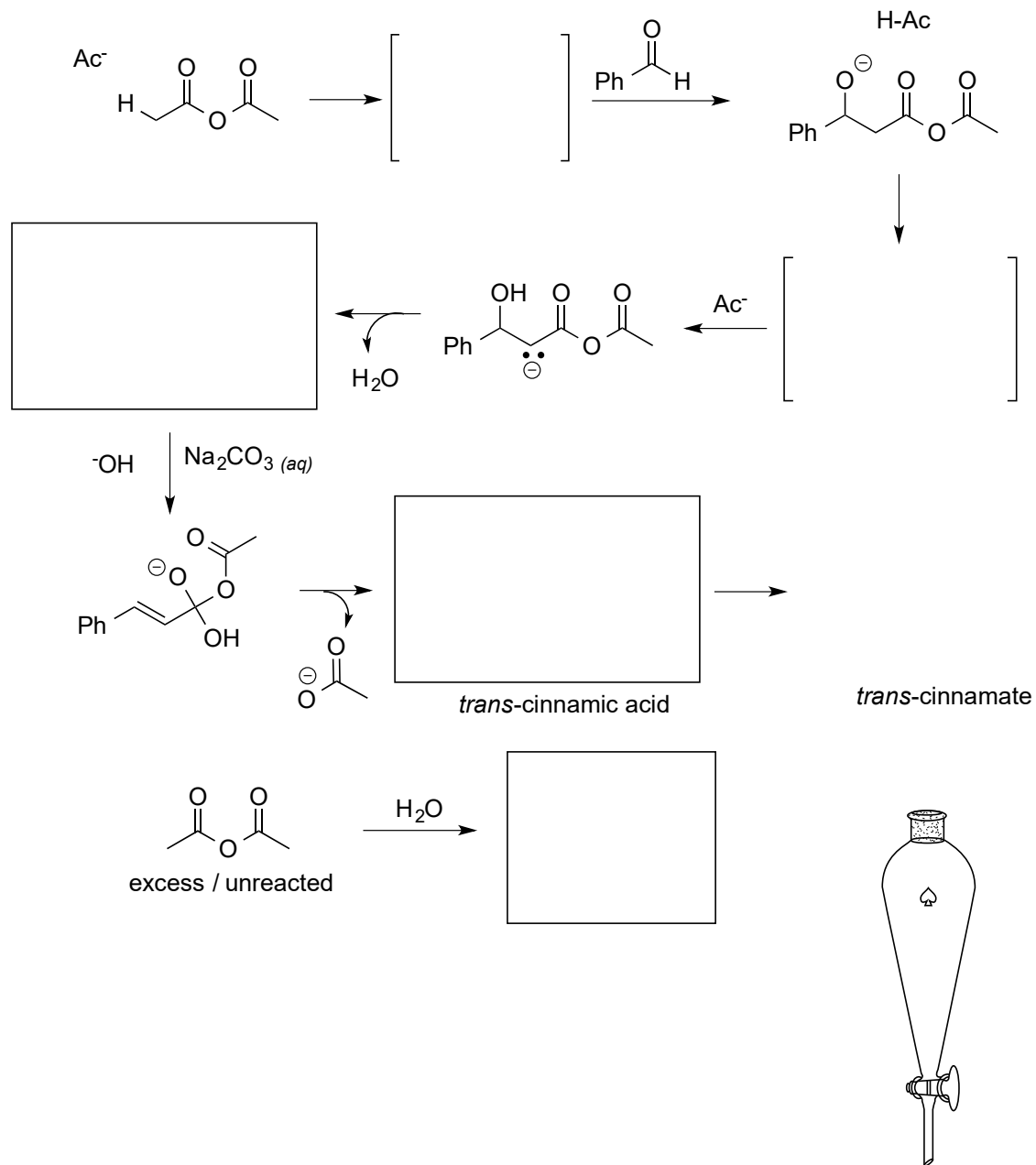


Reaction work-up (overview)

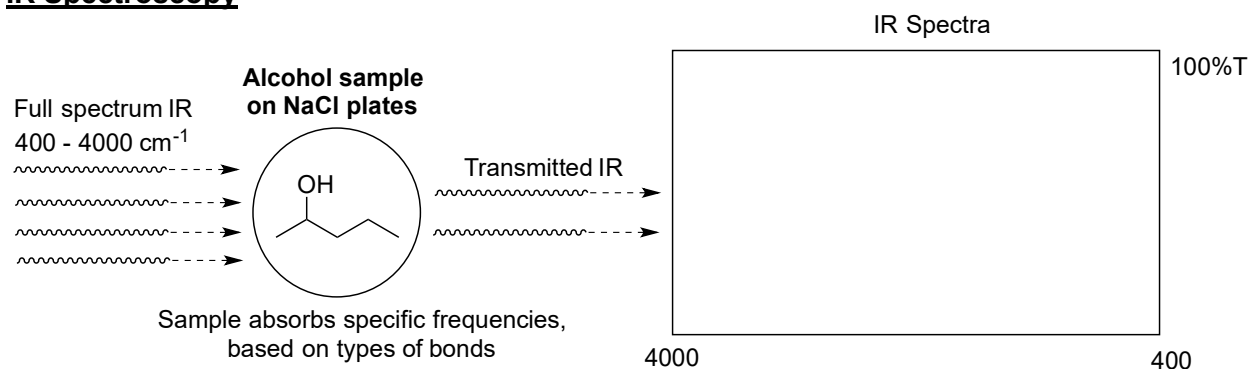
1. H₂O
2. Na₂CO₃
3. *tert*-butyl methyl ether (BME)
5. HCl



Mechanism – Reaction & Work-up

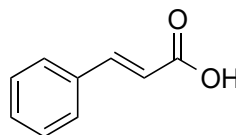
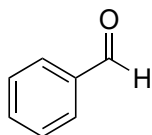


SPECTROSCOPY

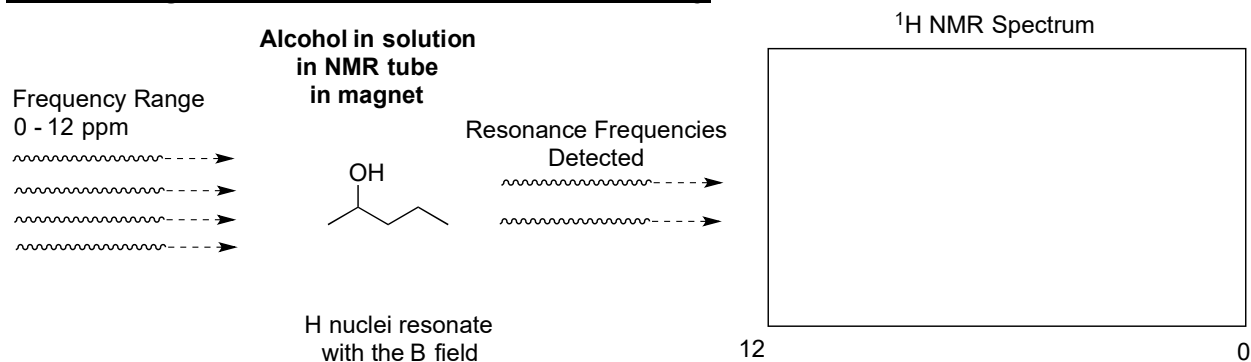
IR Spectroscopy

_____ Bond length corresponds to _____ stretching frequency (wavenumber cm^{-1}).

Where do you expect each compound to absorb?



How does conjugation effect stretching frequency?

Nuclear Magnetic Resonance (NMR) Spectroscopy

In general...

- Electron-donating groups _____ the proton from the B field = _____ chemical shift
- Electron-withdrawing groups _____ the proton = _____ chemical shift

Predicting NMR Spectra from Structures

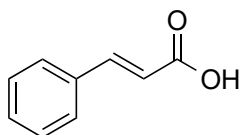
*Refer to spectroscopy tables online for values

¹H NMR

- Integration

- Chemical Shift

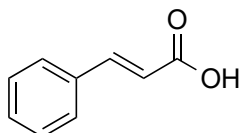
- Splitting



¹³C NMR

- Chemical Shift

- Approximate Peak Height



Exp 2 Summary: