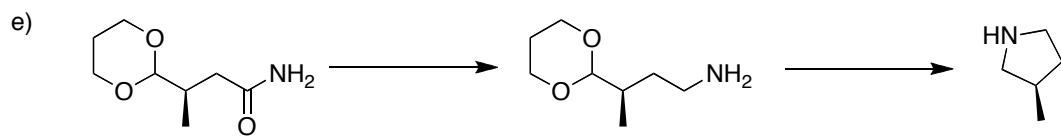
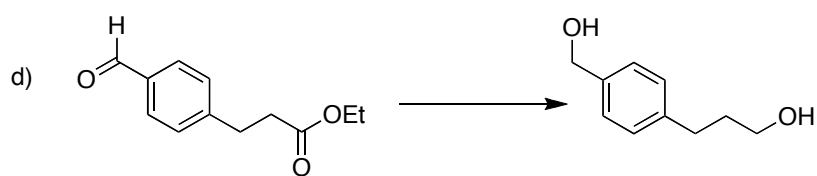
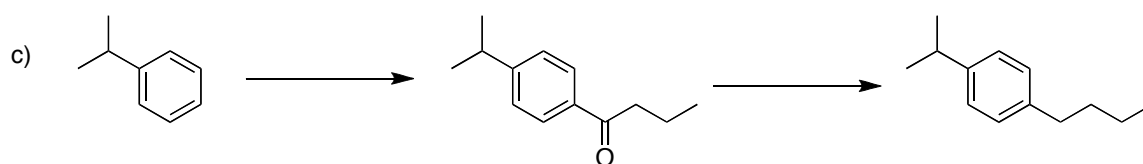
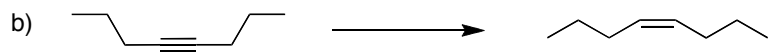
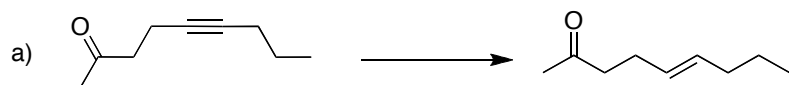
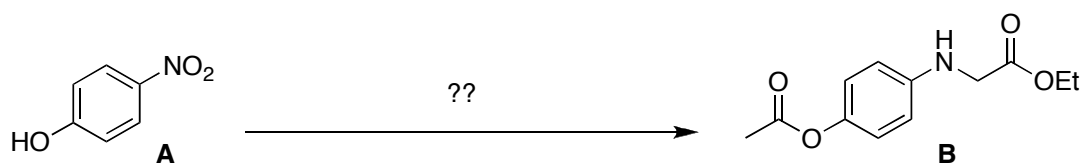
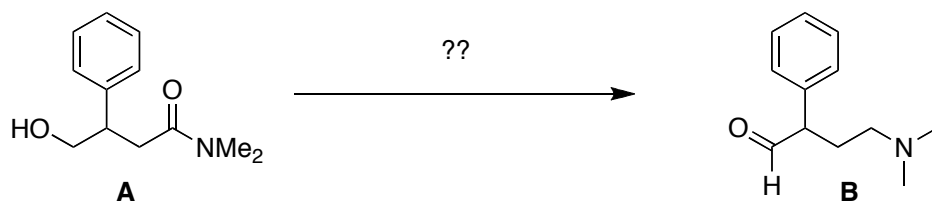


2010 — Problem set 1
Chapter 24.

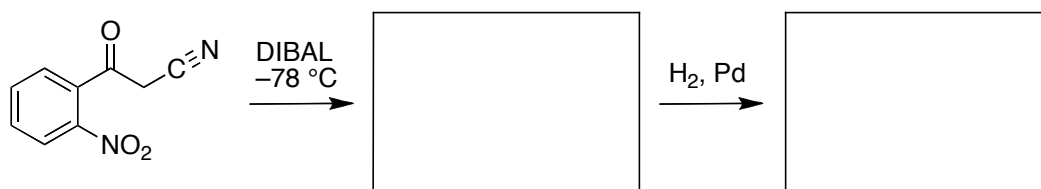
1) Fill in the details of reagents and conditions above each arrow.



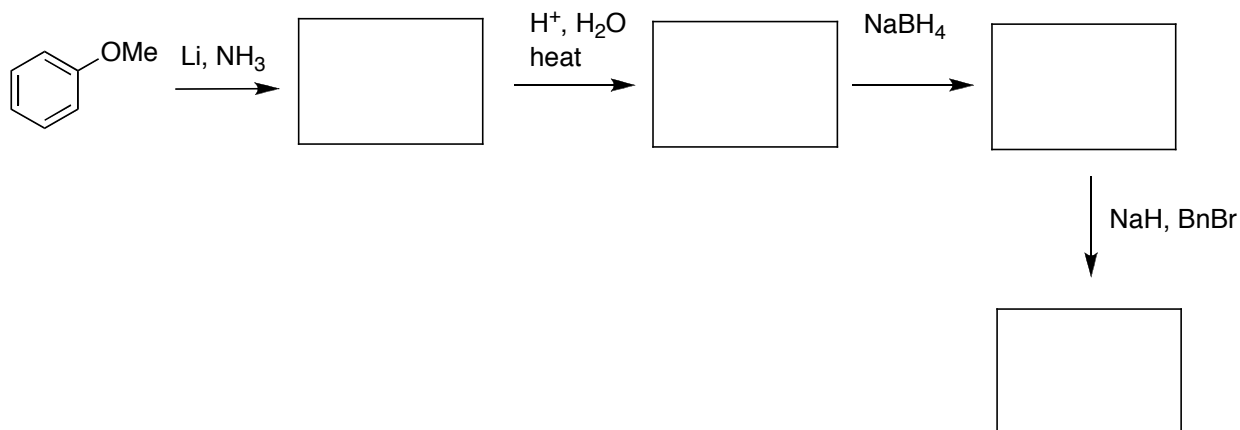
2) How would you make **B** from **A**? Show all reaction conditions and intermediates in the space below each reaction.



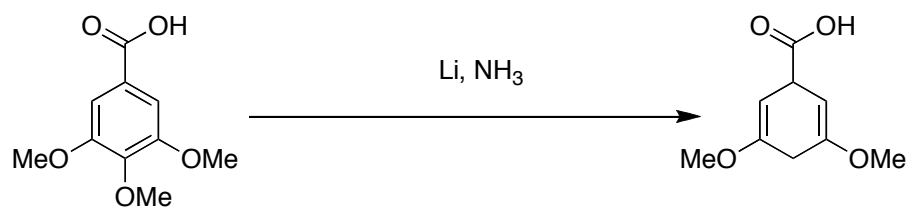
3) Draw the structures of the products formed by each reaction.



Hint: Cyano groups behave similarly to amides under many reduction conditions.

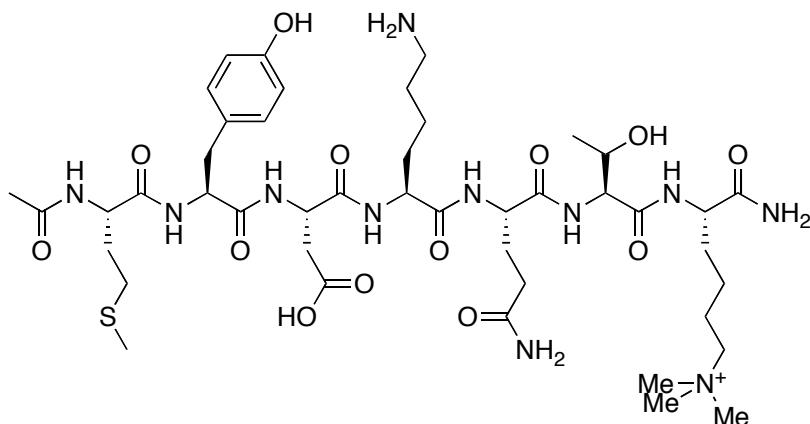


4) Birch reduction of 3,4,5-trimethoxybenzoic acid gives a 94% yield of the dihydrobenzoic acid pictured below that bears only *two* methoxy groups. Based on the mechanism of the Birch reduction, explain the formation of this unexpected product.



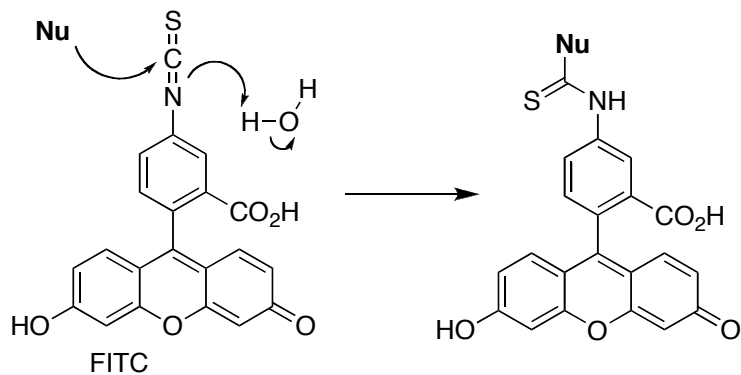
5) The peptide below is a fragment of an alcohol dehydrogenase (the family of enzymes that convert alcohol in your bloodstream to acetaldehyde).

Ac-Met-Tyr-Asp-Lys-Gln-Thr-Lys(Me₃)-NH₂



a) Indicate precisely with arrow and notes on the figure above the 1st, 2nd, and 3rd most acidic protons.

The creation of fluorescently labeled proteins via a selective reaction with an electrophilic fluorescent tag provides is an important procedure routinely run by biochemists. Fluorescein isothiocyanate (FITC) reacts with nucleophiles in water at neutral pH in the manner shown below:



b) Which site on the peptide in the first part of this question will react with FITC?