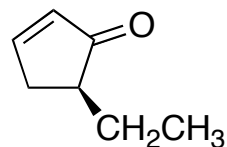
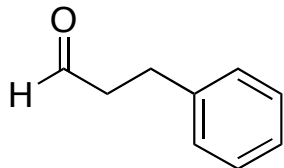
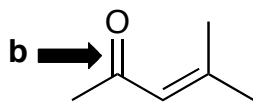
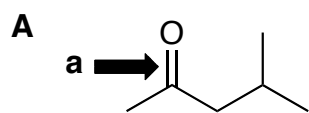


1. Provide an unambiguous name (IUPAC or common) for each of the following molecules. Be sure to indicate stereochemistry where appropriate. (10 points)



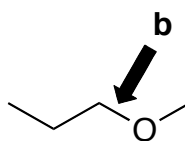
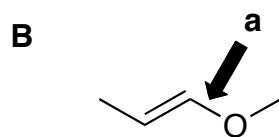
2. For each problem below, assign **a** and **b** to the spectroscopic data shown at the right. Then, using pictures *and* words, provide a rationale for your assignments. *Note: your **explanations** are worth more points than your answer choices.* (12 points)



IR vibrational frequencies

___ 1690 cm^{-1}

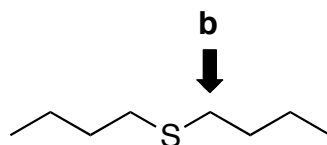
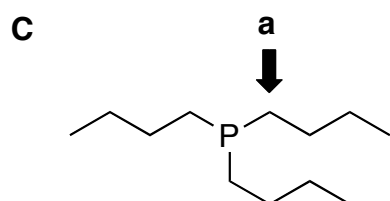
___ 1717 cm^{-1}



IR vibrational frequencies

___ 1055 cm^{-1}

___ 1250 cm^{-1}

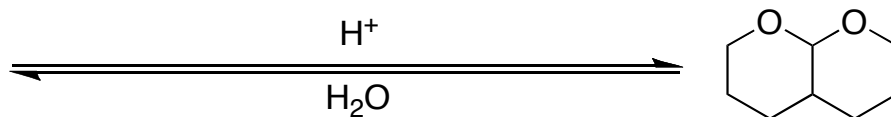


^{13}C NMR chemical shift

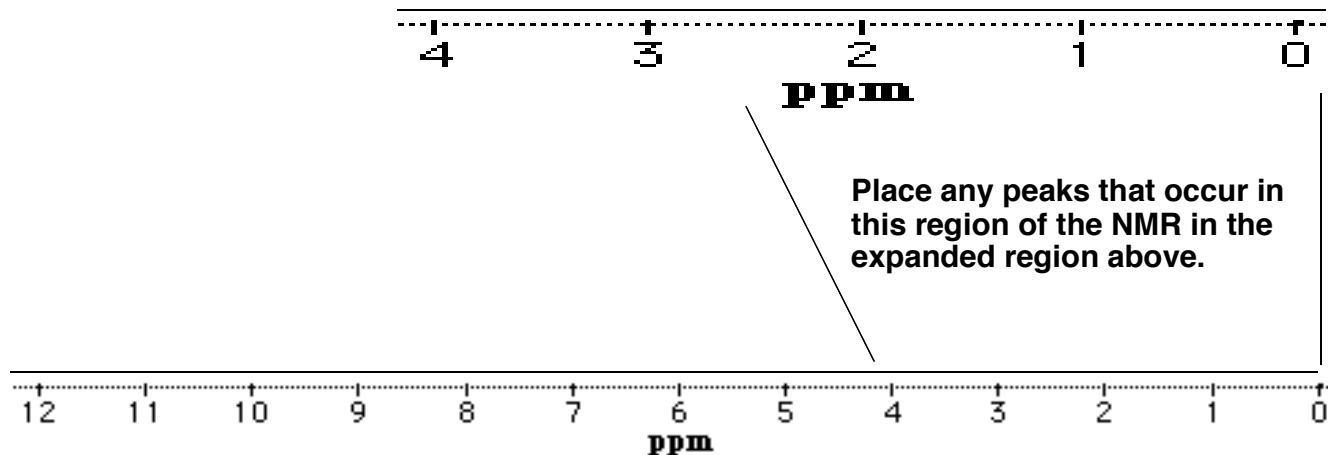
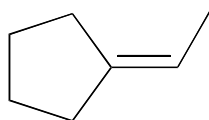
___ 28.4 ppm

___ 32.0 ppm

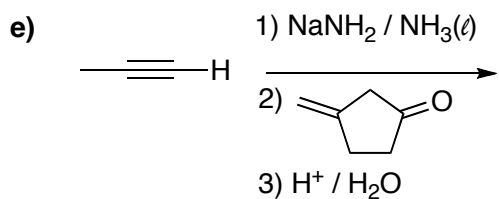
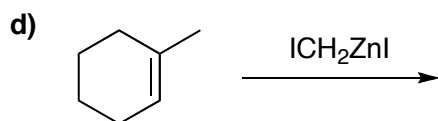
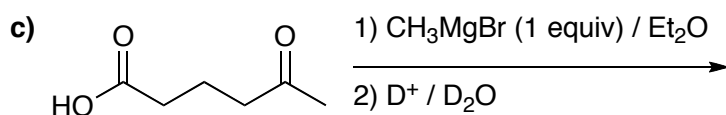
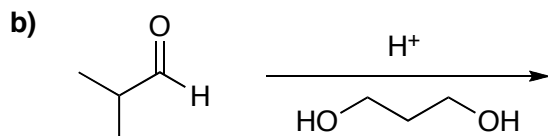
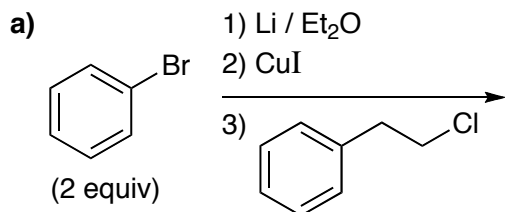
3. Provide a structure for the starting compound needed to produce the product shown. Then show the mechanism of its formation. Be sure to show all charges and lone pairs of electrons in your structures. If you cannot provide a structure, show as much of the reverse mechanism as you can. (12 points)



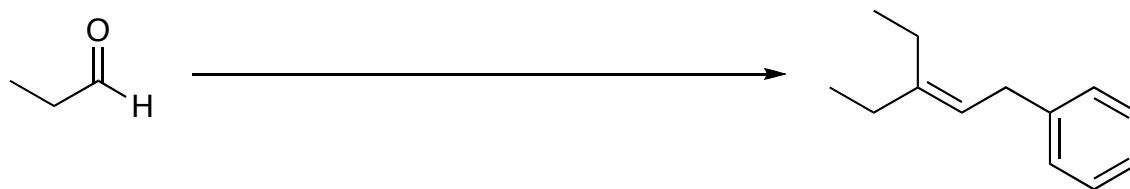
4. Predict the proton NMR spectrum of the following molecule. For full credit, you must assign your peaks *and* show all split peaks with the correct height ratios. (12 points)



5. Complete the following reactions. If you provide more than one product, *circle the major product(s)*. (30 points)



6. Provide a synthesis for the following transformation. For full credit, be sure to draw all intermediary products along the way. (12 points)



7. A compound with the molecular formula $C_7H_{10}O$ gives the following spectra. Provide a structure and assign peaks in each spectrum for full credit. *Circle your answer.* (12 points)

