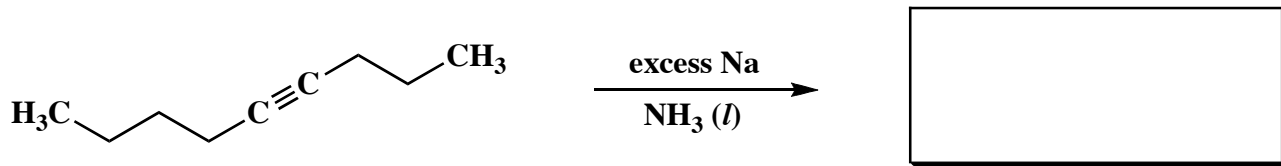## Problem Set 14

1. The product from the following reaction shows mass spectral signals at m/z = 127, 126, 97, and 83. Furthermore, the signal at m/z = 127 is approximately 10% the intensity of the signal at m/z = 126. The most intense signals in the mass spectrum are those at m/z = 97 and 83. Draw the structure of the product. Analyze the mass spectral data to explain your reasoning.


        mass spectral assignments:

                    m/z   **structure**

                 127

                 126

                  97

                  83

        explanation of *m/z* = 127 and *m/z* = 126 relative intensities:

        explanation of *m/z* = 97 and 83 intensities:

2. An organic compound has a molecular ion at m/z = 104, an M+1 isotope peak at m/z = 105, and an M+2 isotope peak at m/z = 106. The M+1 and M+2 signals are 6% and 33% of the molecular ion's intensity, respectively. Use all of the above mass spectral data to determine the molecular formula of the compound. Given this molecular formula, how many degrees of unsaturation are present? Show your reasoning. Finally, draw at least three different structural isomers that are consistent with this molecular formula.

3. When the following reaction was run, a product was isolated that showed infrared absorptions at
3250, 3050, 2910, 1610, 1585, 1500, 1460, and 1050 cm⁻¹. Draw the structure of the product.
Use the "Selected Infrared Correlations" table at http://www.csun.edu/~hcchm007/333ir.pdf
to assign all of these absorptions. In particular, state the type of bond involved in each absorption,
and whether the vibration is a stretch or a bend.
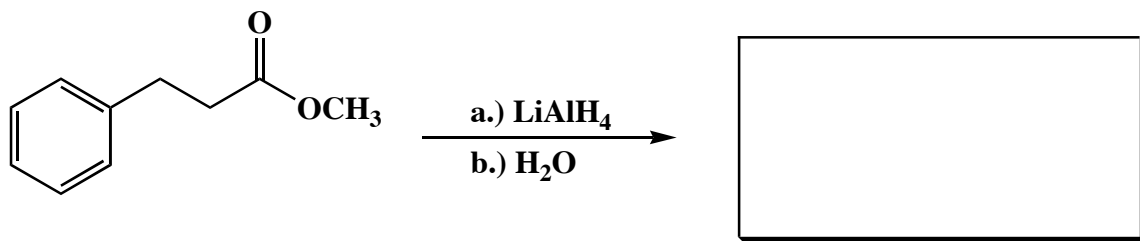
infrared assignments:

absorption (cm⁻¹)	assignment
3250	
3050	
2910	
1610	
1585	
1500	
1460	
1050	