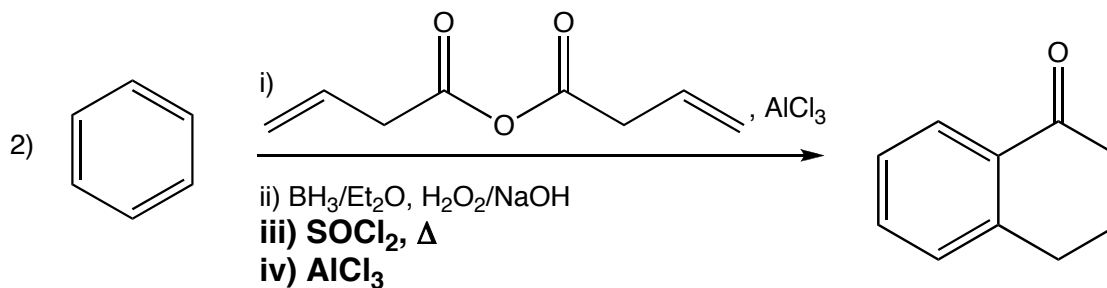
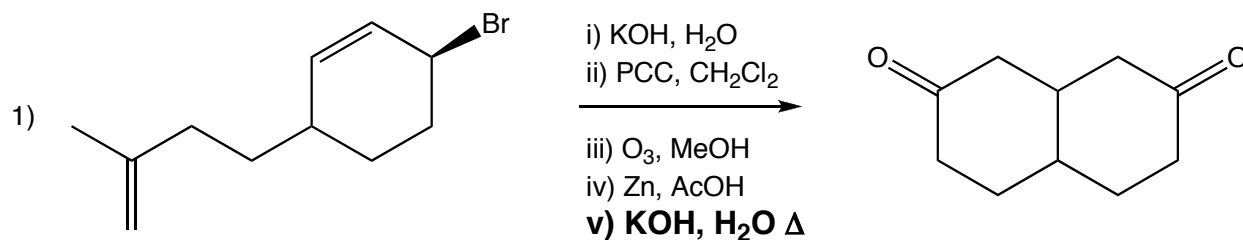


Name: _____

Final Exam – Principles of Organic Chemistry II – CH 212
April 28th 2008 – 3:00 to 6:00 PM

Look over the whole exam and work on what you feel more comfortable FIRST!
Show all your work if you want to receive partial credit. Use front and back of each page to write your answers. Be clear and concise, and use PENCIL to avoid making a big mess...

1) (30 points) Consider the following reaction schemes:

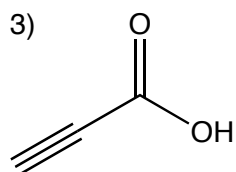
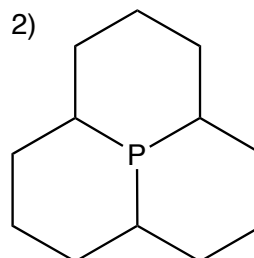
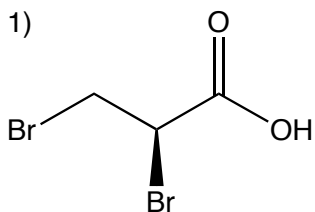


a) Provide the structures of all the intermediates.

b) Write detailed reaction mechanisms for the steps highlighted with bold/oversized letters.

Name: _____

2) (30 points) For each of the following compounds:

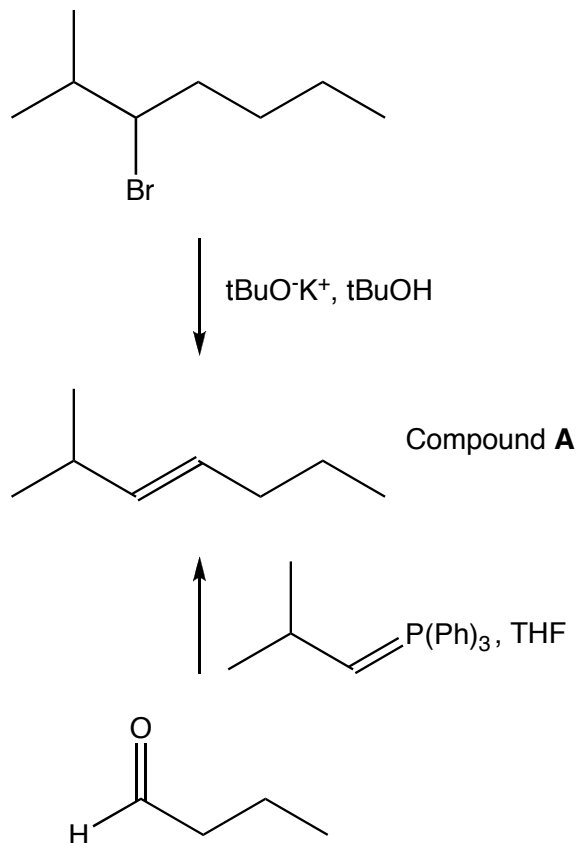


- Calculate their degree of unsaturation, and, if appropriate, show in the structure what gives rise to this number (i.e., double bonds, rings, etc...).
- Determine how many ^1H and ^{13}C NMR signals you will find in their spectra (i.e., identify magnetically equivalent and non-equivalent nuclei).
- To which of the three compounds shown above does the **IR spectra** provided in the following pages belong to?
- To which of the three compounds shown above do the ^1H and ^{13}C NMR spectra given in the following pages belong to?

Note: P should be treated in the same way as N...

Name: _____

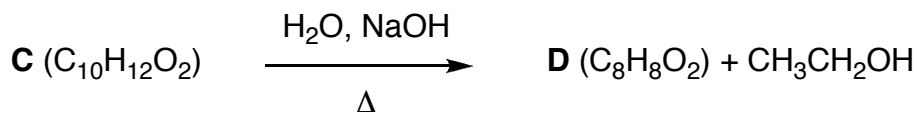
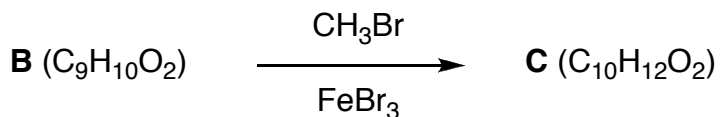
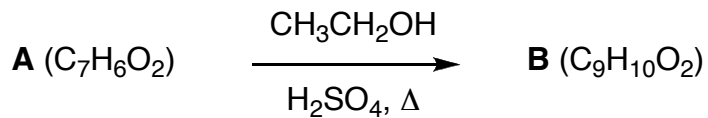
- 3) (30 points) You need to prepare an aliphatic alkene (compound **A**) and have two possible routes. One involves a simple elimination reaction starting from an haloalkane (top), and the other a Wittig reaction using a butyraldehyde and a phosphorous ylide (bottom):



- Write detailed mechanisms for both reactions
- Which route would you choose to prepare compound **A** in the highest yields? Explain your answer clearly.

Name: _____

4) (30 points) A (very) simple aromatic acid is subjected to the following reactions:

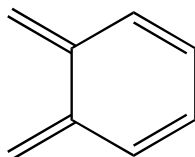


In addition to the information provided above, you recorded NMR for compounds **A** through **D** (all provided in the following pages).

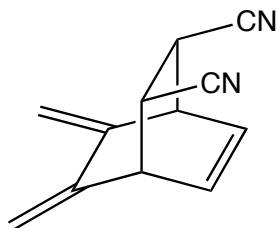
With all these data elucidate the structures of compounds **A** through **D**. Given the simplicity of the reactions and spectra involved you have to do a detailed assignment of all the signals in the ^1H spectra of compounds **B**, **C**, and **D**.

Name: _____

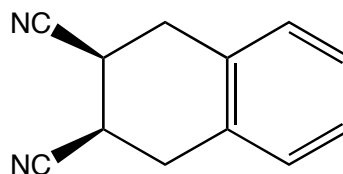
5) (30 points) The following molecule can be considered as having two dienes:



When treated with *cis*-1,2-dicyanoethene (NC-CH=CH-CN), two Diels-Alder products can theoretically be obtained (compounds **A** and **B**):



A



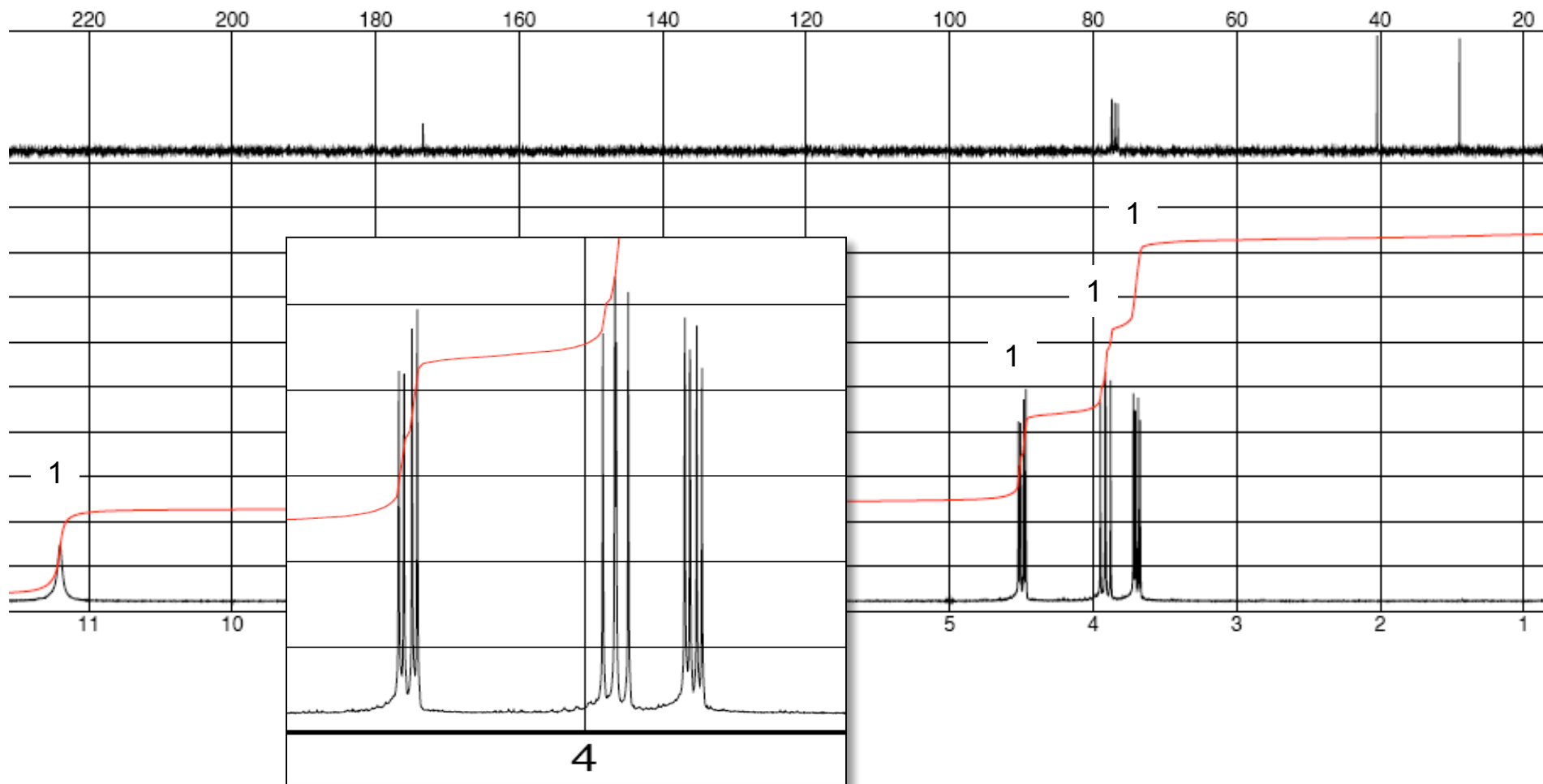
B

- Write detailed mechanisms for the formation of **A** and **B**.
- Which one of the two products is most likely to form and why? Explain your reasoning clearly based on the structure of the products formed.

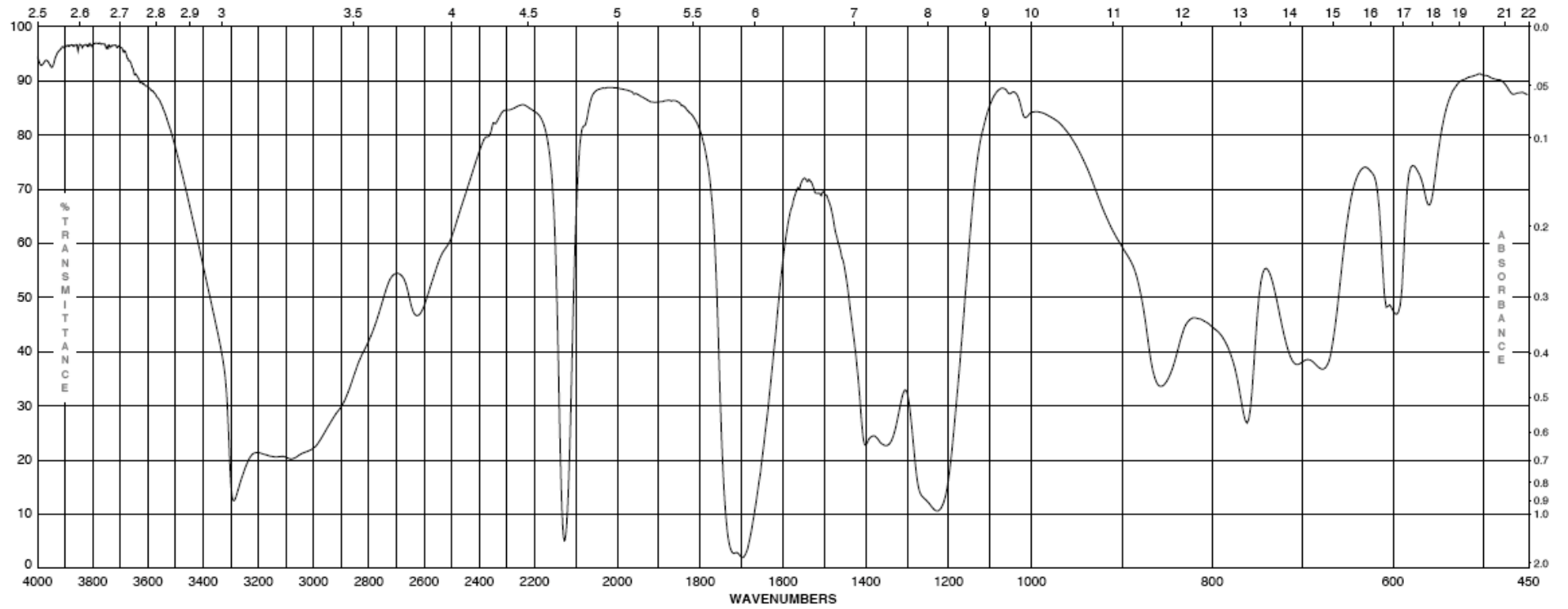
Name: _____

Name: _____

Problem 2 – NMR Spectrum

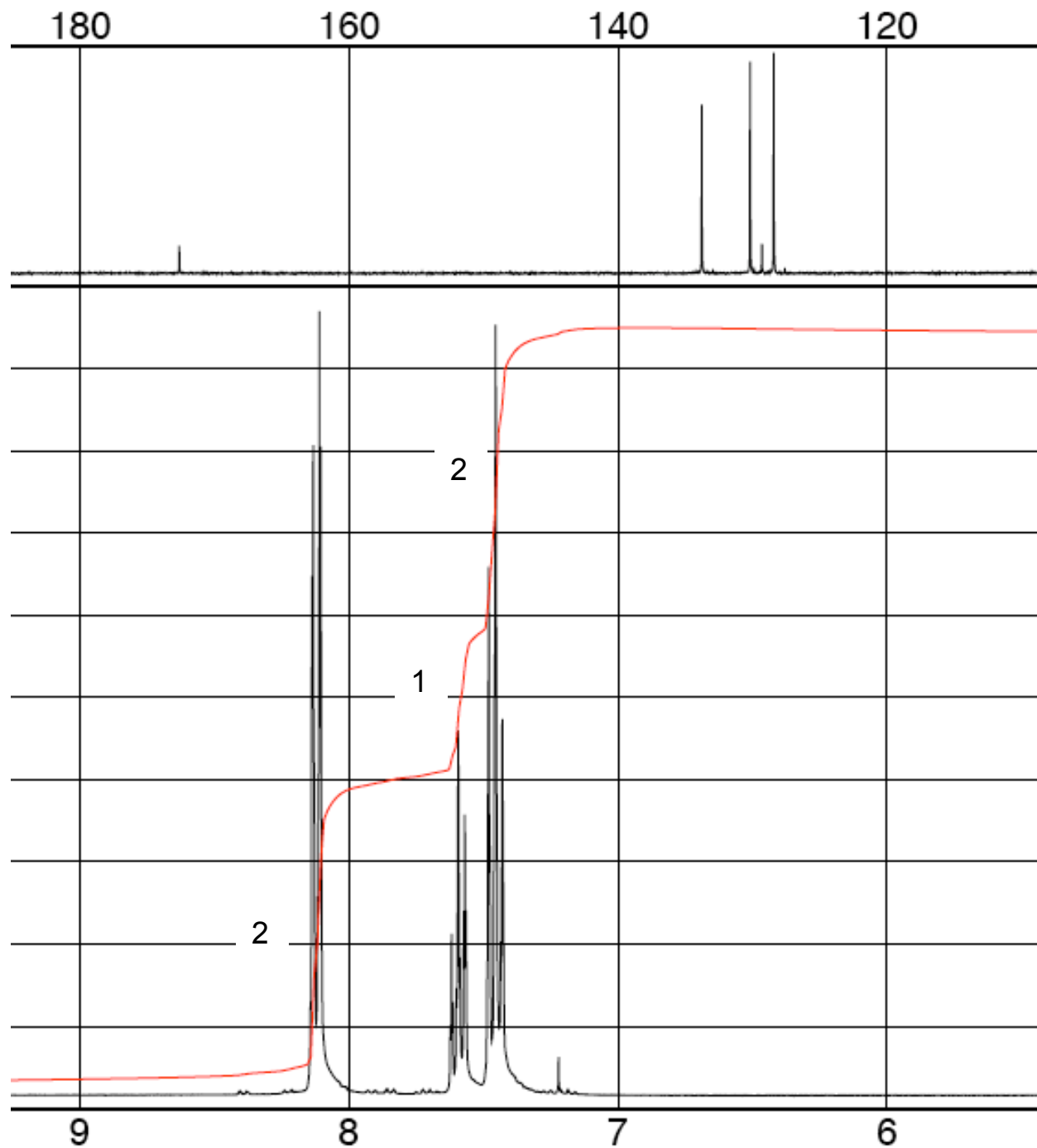


Problem 2 – IR Spectrum

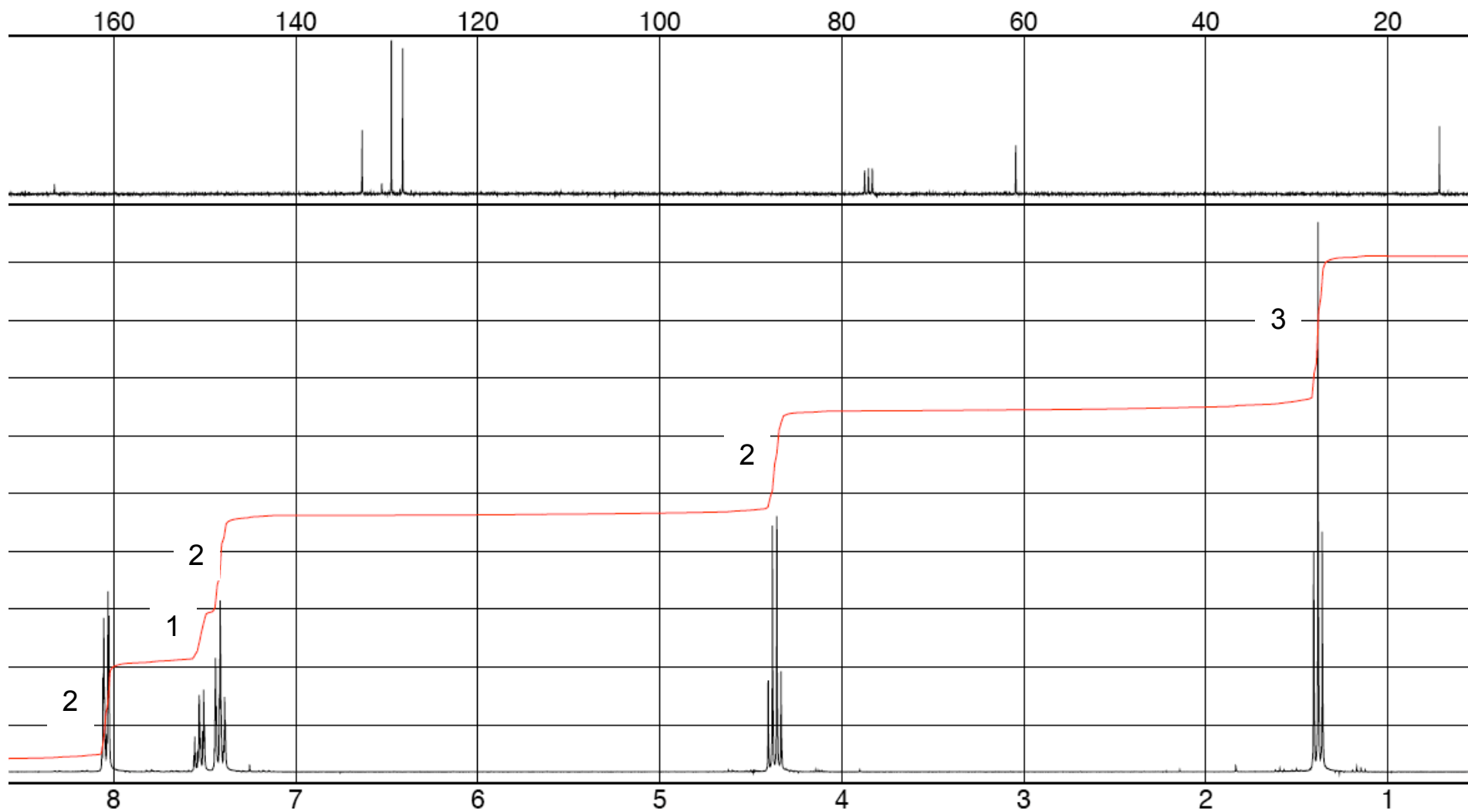


Problem 4 – Compound A

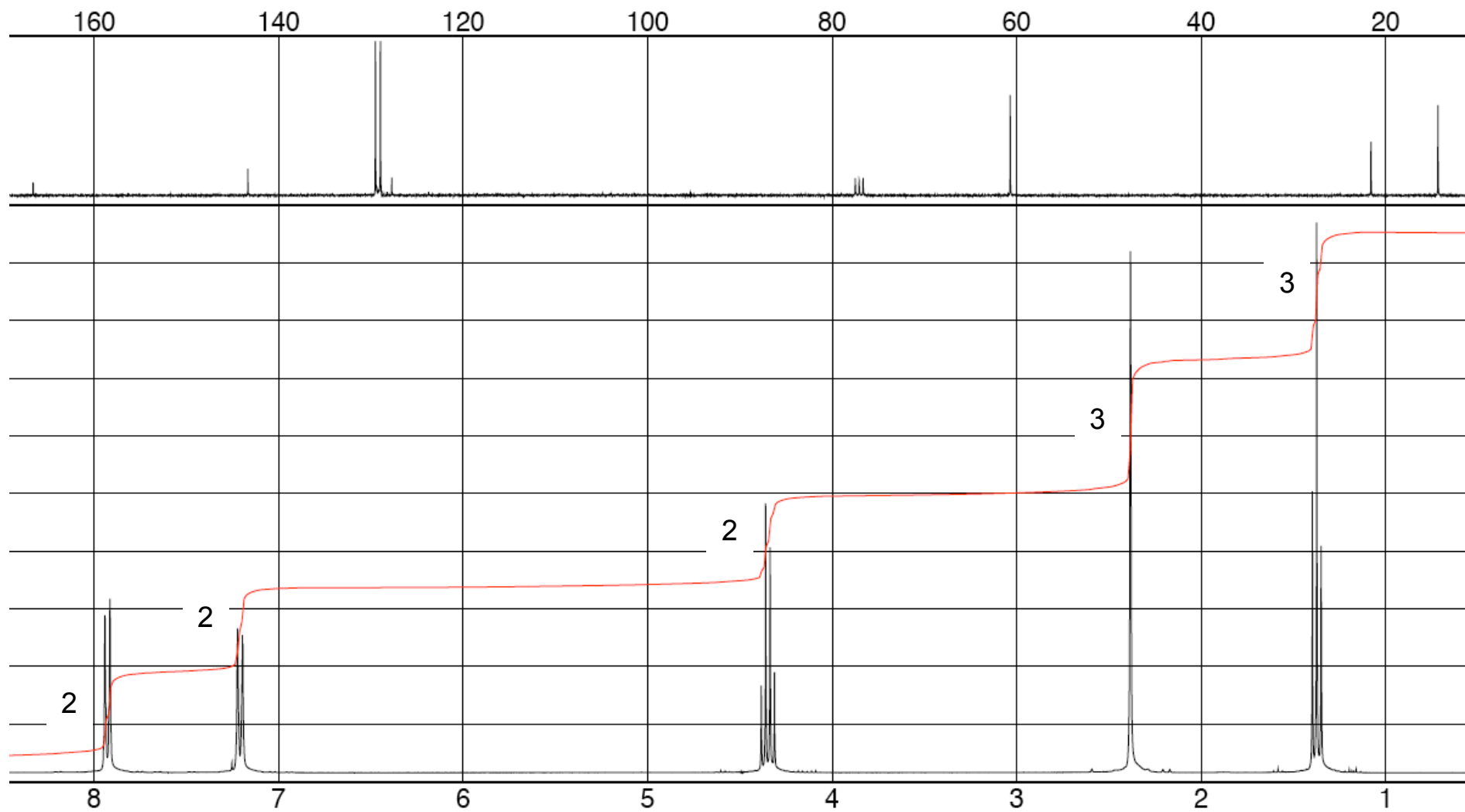
There's an additional broad signal that integrates to one proton at 12.9 ppm...



Problem 5 – Compound B



Problem 5 – Compound C



Problem 5 – Compound D

