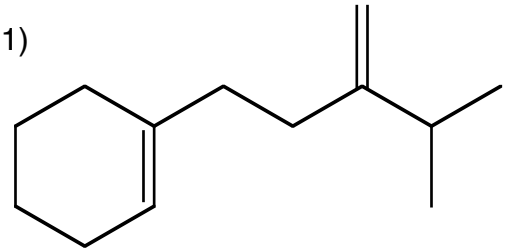
 Name: _____

Exam II – Principles of Organic Chemistry II – CH 212
April 6th 2004 – 1:00 PM to 3:00 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…

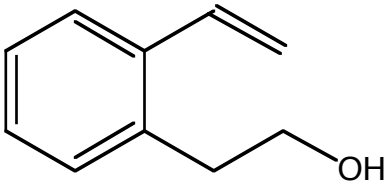
1) (30 points) Consider the following reaction schemes:

1)



i) mCPBA (1 eq.), CH_2Cl_2
ii) BH_3, ether / H_2O_2 / NaOH
→ **$C_{13}H_{22}$**
iv) PBr_3, ether
v) Mg, THF / H_2O
vi) H_2SO_4,Δ

2)



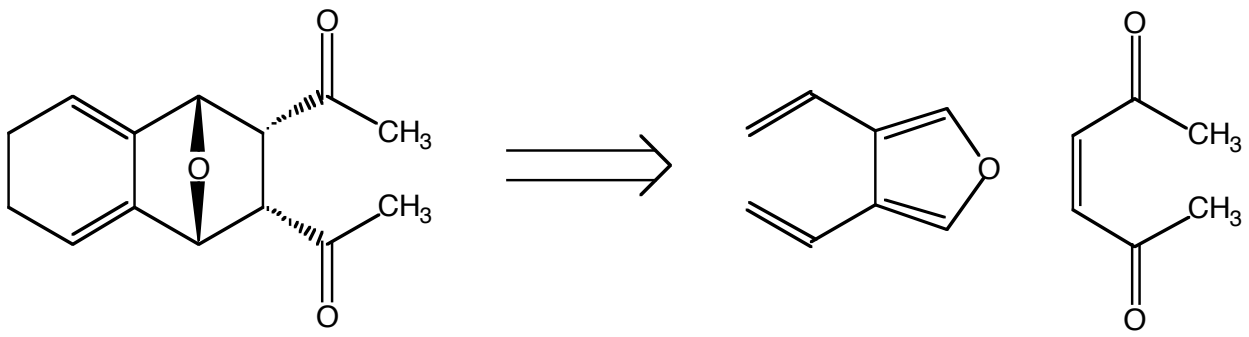
i) O_3, CH_2Cl_2
ii) Zn, AcOH
→ **$C_9H_{10}O$**
iii) PBr_3, ether
iv) $NaBH_4$, EtOH
v) KOH, THF, Δ

a) Provide the structures of all the intermediates and products.

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

 Name: _____

2) (20 points) Compound **A** can be prepared in two steps starting from compounds **B** and **C**:



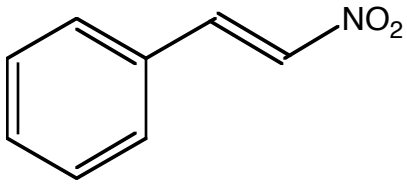
A **B** **C**

Propose the synthetic approach you would follow to obtain **A** starting from **B** and **C**, including detailed mechanisms for the two reactions.

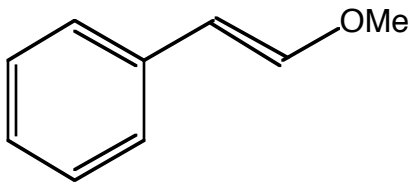
 Name: _____

3) (20 points) Consider the following aromatic compounds:

A



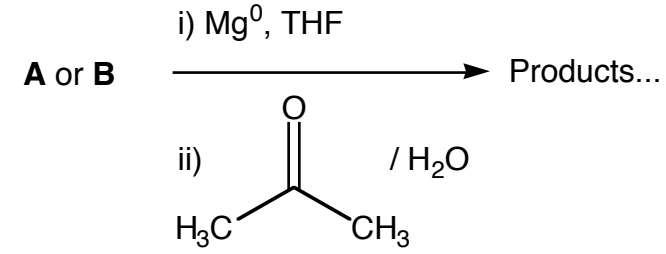
B

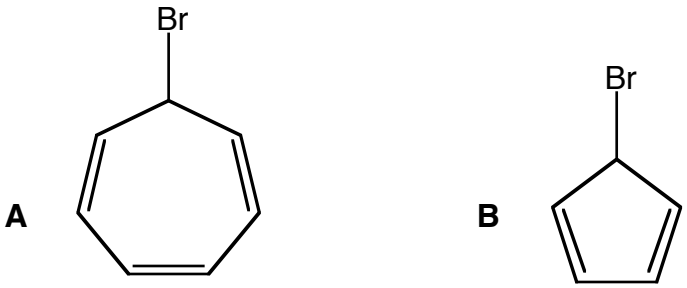


Based on your knowledge of aromatic electrophilic substitution reactions, predict the major products that will be obtained from the mono-bromination of each compound. Make sure to explain the results based on the mechanism of the reaction and the directing properties of each substituent.

 Name: _____

4) (20 points) You studied the kinetics of two Grigniard reactions using bromides **A** and **B** as starting materials, and acetone as the carbonyl compound:



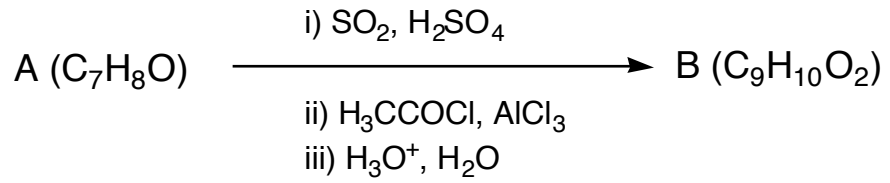


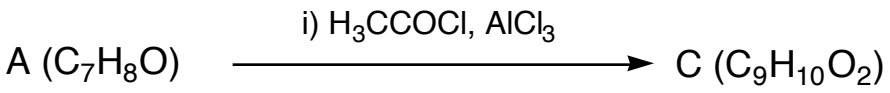
a) Write the mechanism for the Grigniard reaction for both bromides, as well as the expected product in each case.

b) You measured the rates for both reactions, and found that when you use compound **B** the reaction proceeds rapidly. However, when you use compound **A**, you get no reaction products. Explain this observation based on the structure of the compounds and the intermediates involved in each case.

 Name: _____

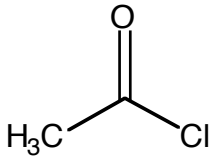
5) (30 points) A certain aromatic ether **A** (C_7H_8O) is subjected to the following reactions:





In addition to the information provided above, you recorded ^1H NMR and IR data for compounds **A**, **B**, and **C**, which is attached in the following pages. With all these data, and knowing that **B** and **C** are isomers:

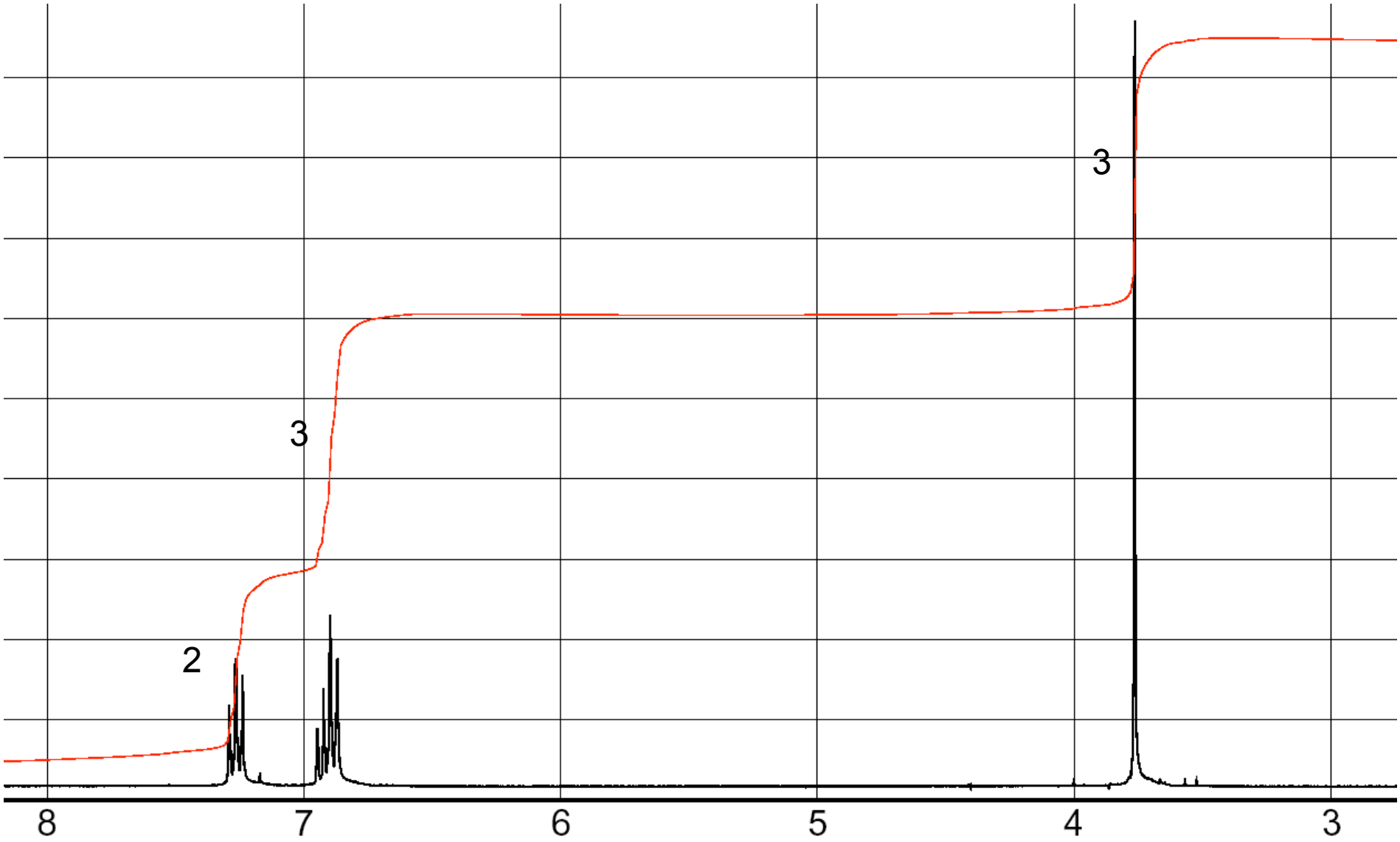
a) Elucidate the structures of compounds **A**, **B**, and **C**.
b) Provide the structures of all the intermediates for the conversion of **A** into **B**.
c) Do a tentative assignment of the aromatic ^1H NMR signals and multiplicities for compounds **A**, **B**, and **C** based on the multiplicities you expect for them. You can do this on their spectra (but remember to turn them in if you do…).

Note: H_3CCOCl is acetyl chloride, 

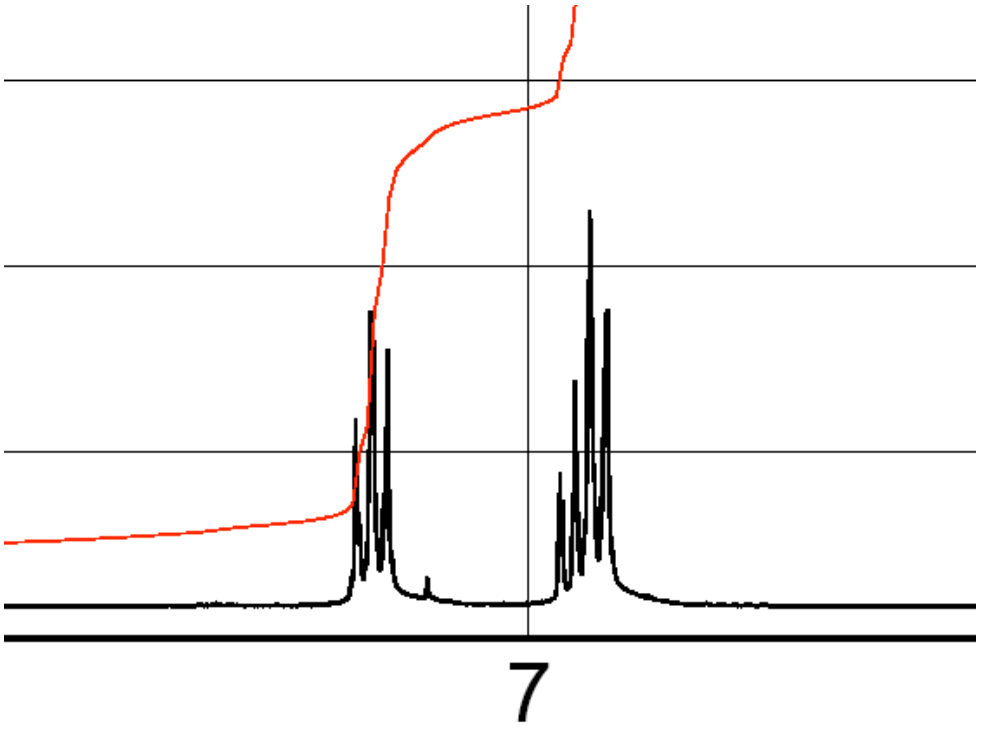
Name: _____

Name: _____

Problem 5 - Compound A - ^{1}H NMR

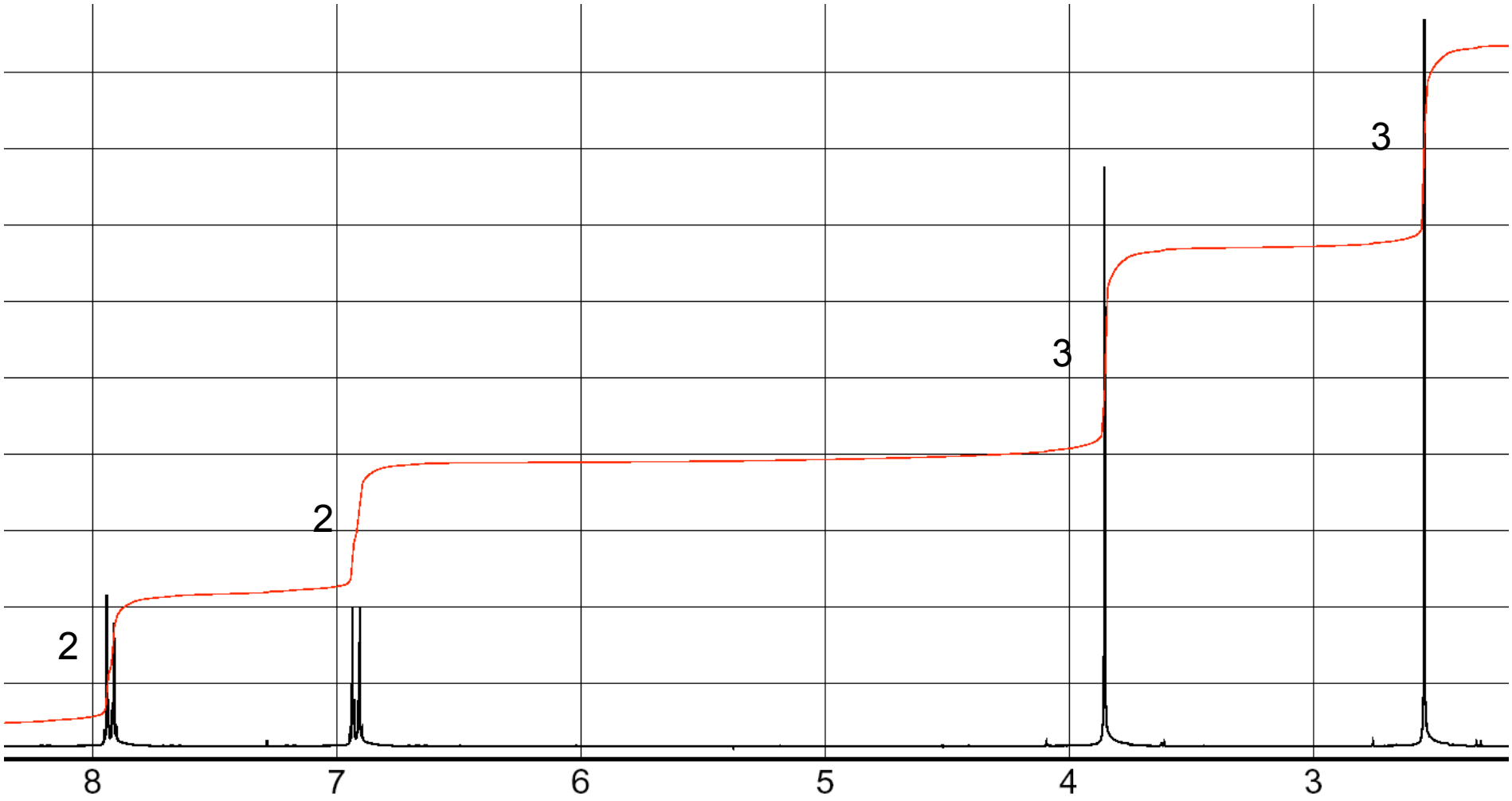


Problem 5 - Compound A - Expansions

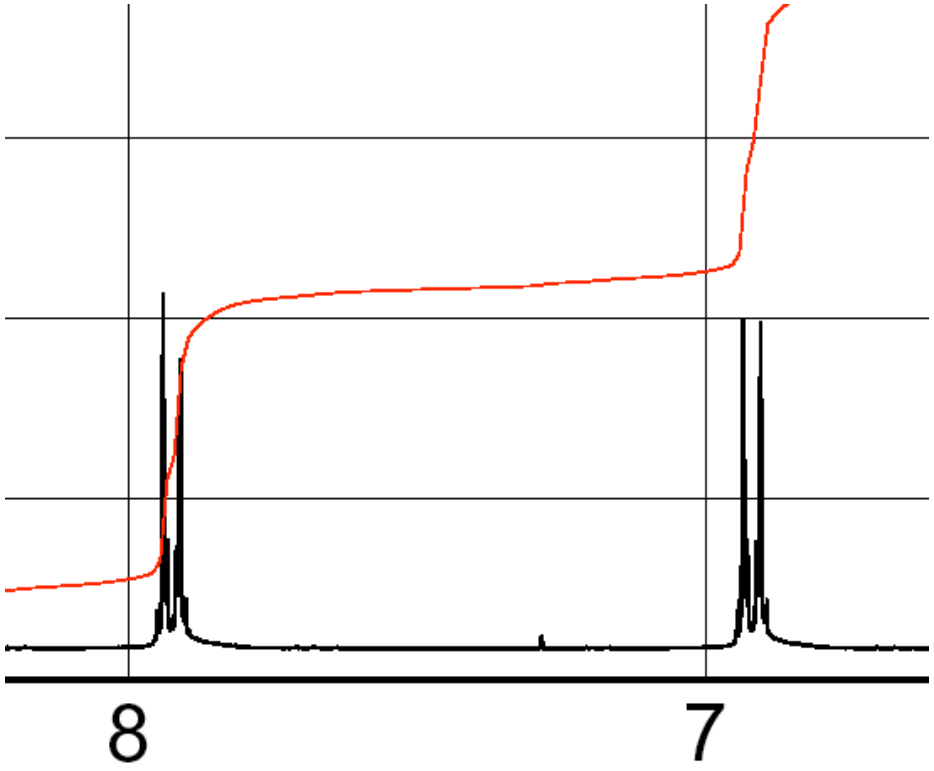


Relevant IR Peaks
1045 (medium)

Problem 5 - Compound C - ^{1}H NMR

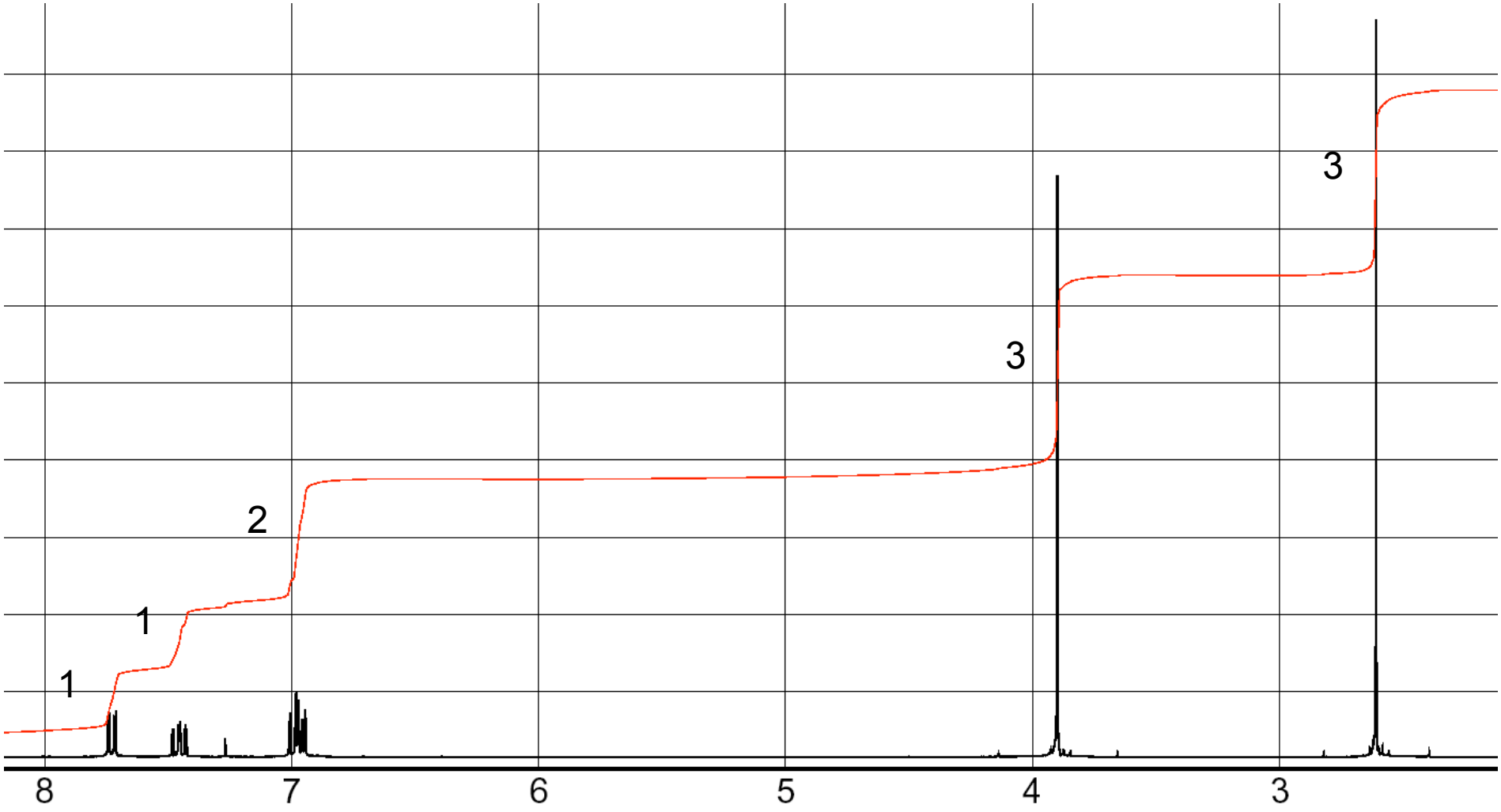


Problem 5 - Compound C - Expansions

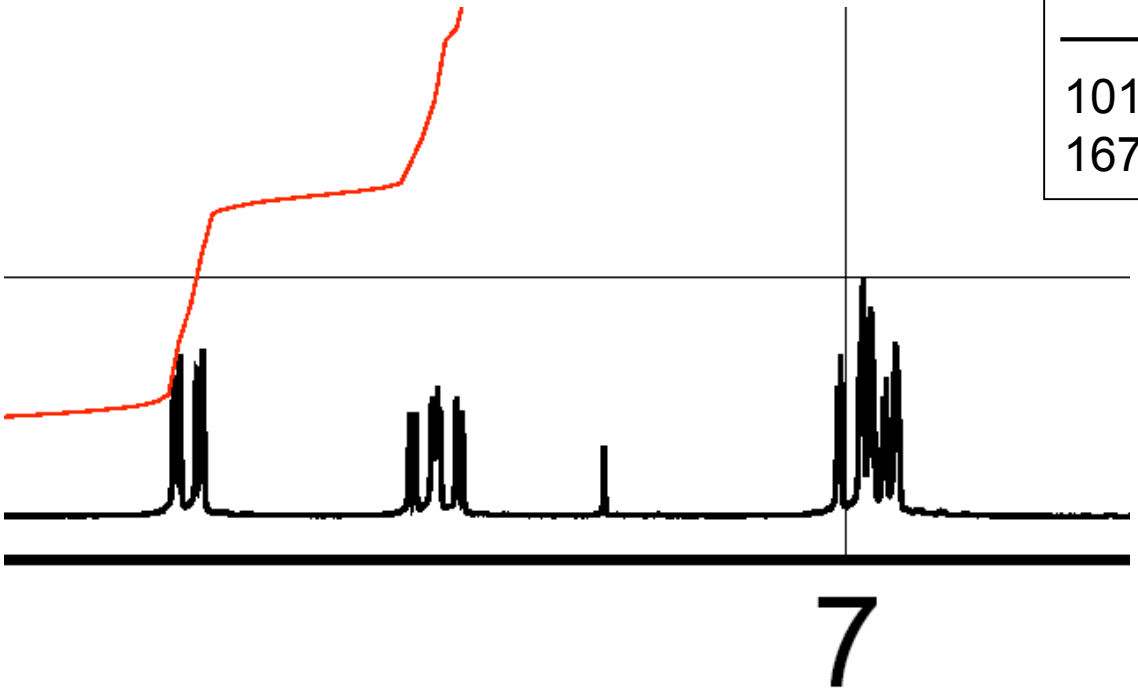


Relevant IR Peaks
1025 (medium)
1675 (strong)

Problem 5 - Compound B - ^{1}H NMR



Problem 5 - Compound B - Expansions



Relevant IR Peaks
1015 (medium) 1675 (strong)