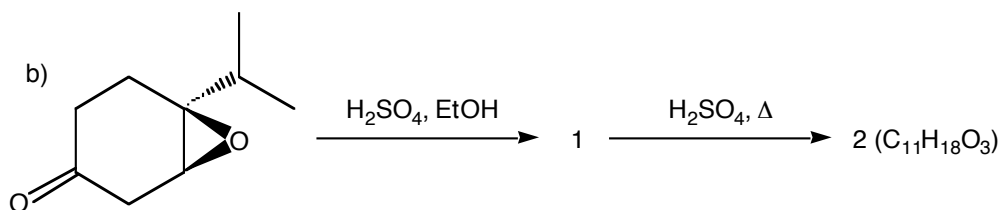
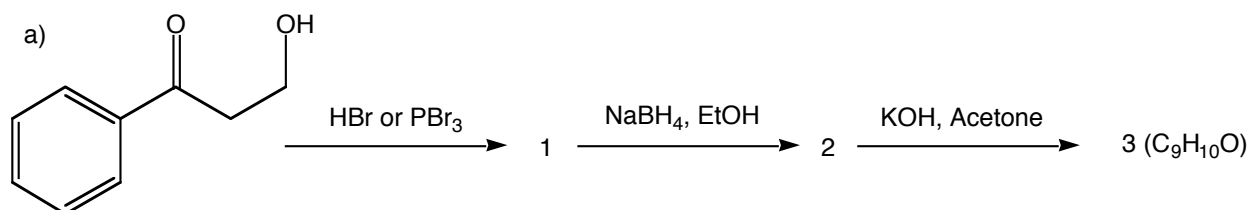


Name: _____

Exam I – Principles of Organic Chemistry II – CH 212
February 28th 2003 – 7:30 AM to 9:00 AM

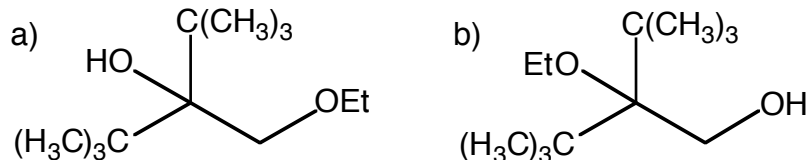
Look over the whole exam and work on what you feel more comfortable FIRST!
Show all your work if you want to receive partial credit. Use front and back of each page to write your answers. Be clear and concise, and use PENCIL to avoid making a big mess...

- 1) (30 points) Provide the structure of the products and intermediates for the following reactions sequences, giving clear mechanisms for their formation. Indicate the stereochemistry of all chiral centers in the final products if these are optically active.

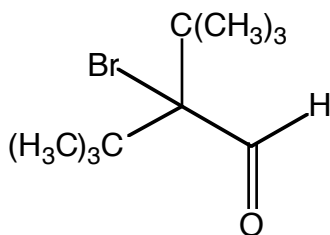


Name: _____

2) (30 points) You are interested in preparing the following hydroxy ethers:



The structure of the starting material you wish to use for the preparation of both compounds is given below:

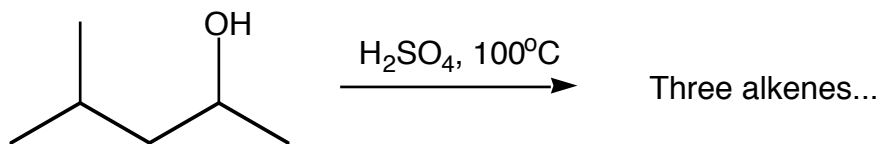


Apart from this starting material, you have sodium borohydride (NaBH_4), sodium ethoxide (EtONa), potassium hydroxide (KOH), and a variety of solvents. Propose a synthetic route to compounds **a** and **b** from the starting material given. Support your answer with reaction mechanisms.

Hint: You can prepare compound **a** in two steps, and compound **b** in three steps. Additionally, one of the intermediates in the preparation of compound **b** is cyclic...

Name: _____

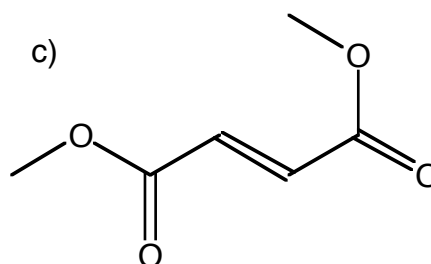
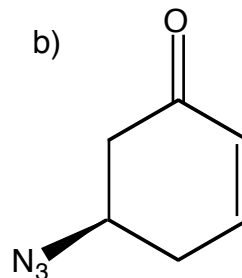
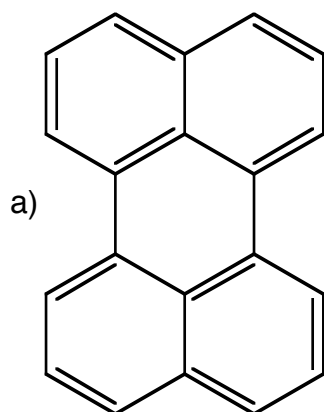
- 3) (20 points) When treated with concentrated sulfuric acid (H_2SO_4) at 100°C , the following alcohol dehydrates to give a mixture of three isomeric alkenes:



- Draw the structures of the three alkenes, and propose a mechanism for their formation.
- If you could use either $^1\text{H-NMR}$ or IR to differentiate between the three alkenes, which technique would you use? Briefly, explain how you would use the technique you selected to differentiate between the possible alkenes.

Name: _____

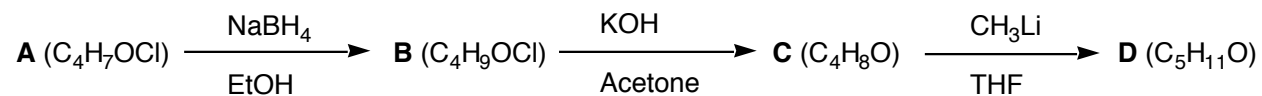
4) (30 points) For each of the following three compounds:



- Calculate their degree of insaturation, and 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).
- For each magnetically equivalent set of protons, specify their multiplicity, assuming that all coupling constants are equal.
- To which of the three compounds shown above do the ^1H - and ^{13}C -NMR spectra provided in the following pages belong?

Name: _____

- 5) (30 points) You came across a certain chloroketone of molecular formula C_4H_7OCl (compound **A**) and decided to run a number of reactions to kill time:



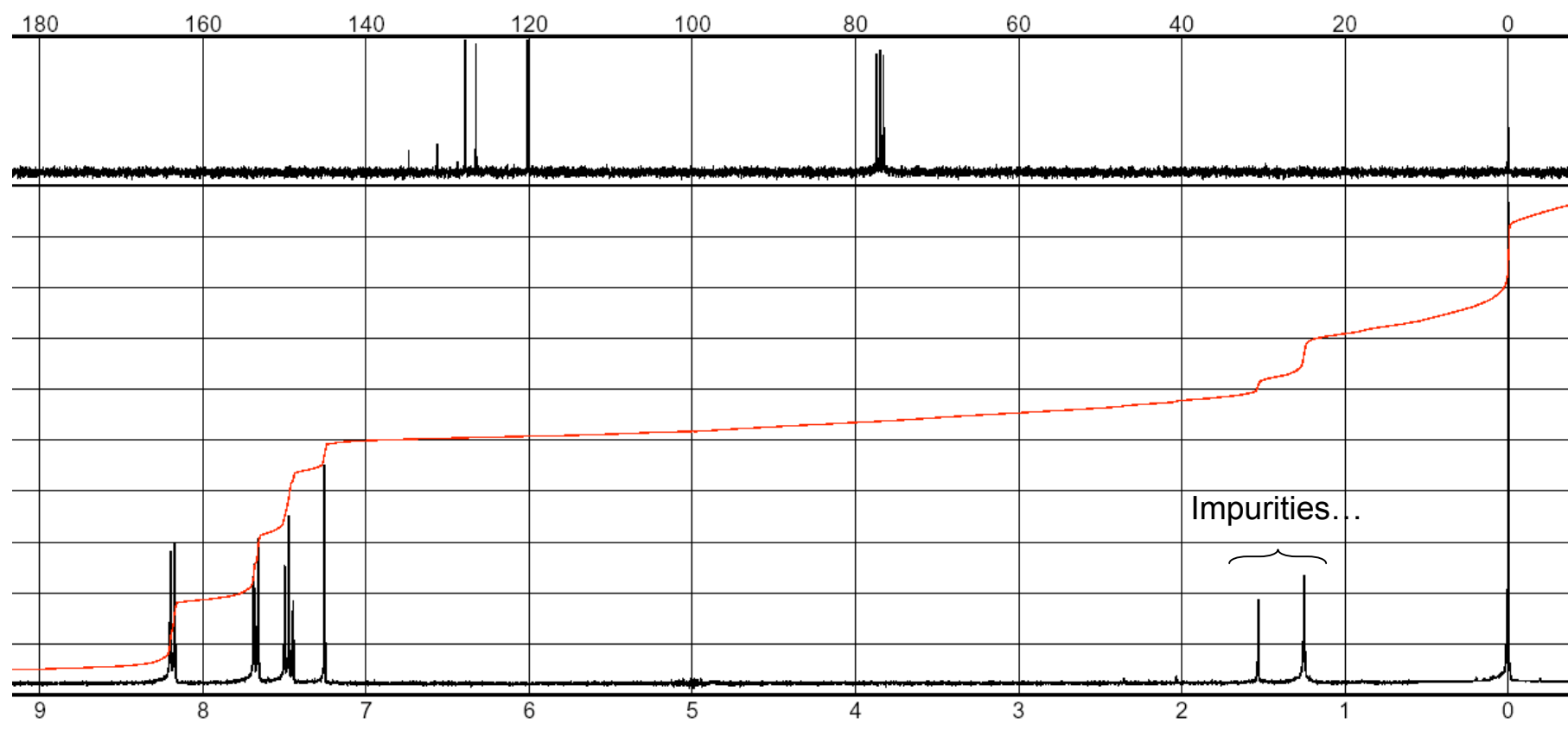
$^1\text{H-NMR}$, $^{13}\text{C-NMR}$, and IR spectra for compounds **A**, **C**, and **D** are provided in the following pages.

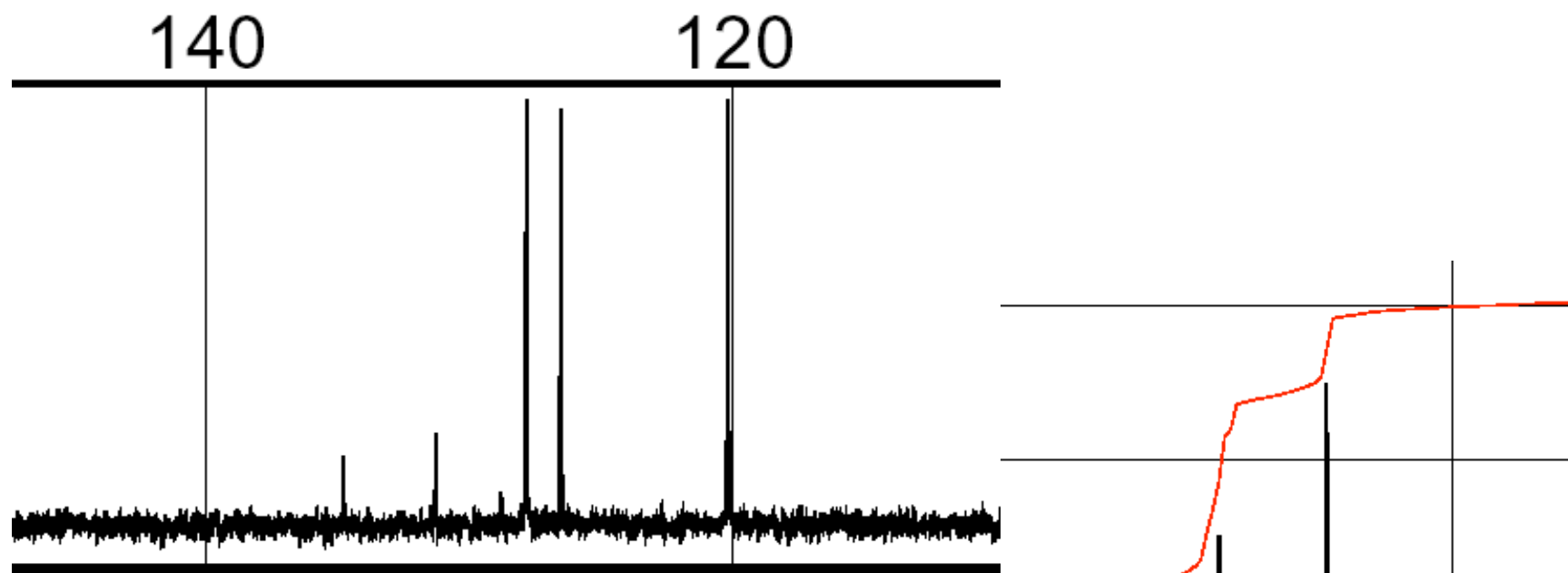
Using the information provided, give the structures for compounds **A** through **D**. You do not need to write all the reaction mechanisms, but make sure to do a proper assignment of all the signals and multiplicities for all compounds. You can do that in the spectra if you want, but make sure to turn them in at the end of the exam.

Name: _____

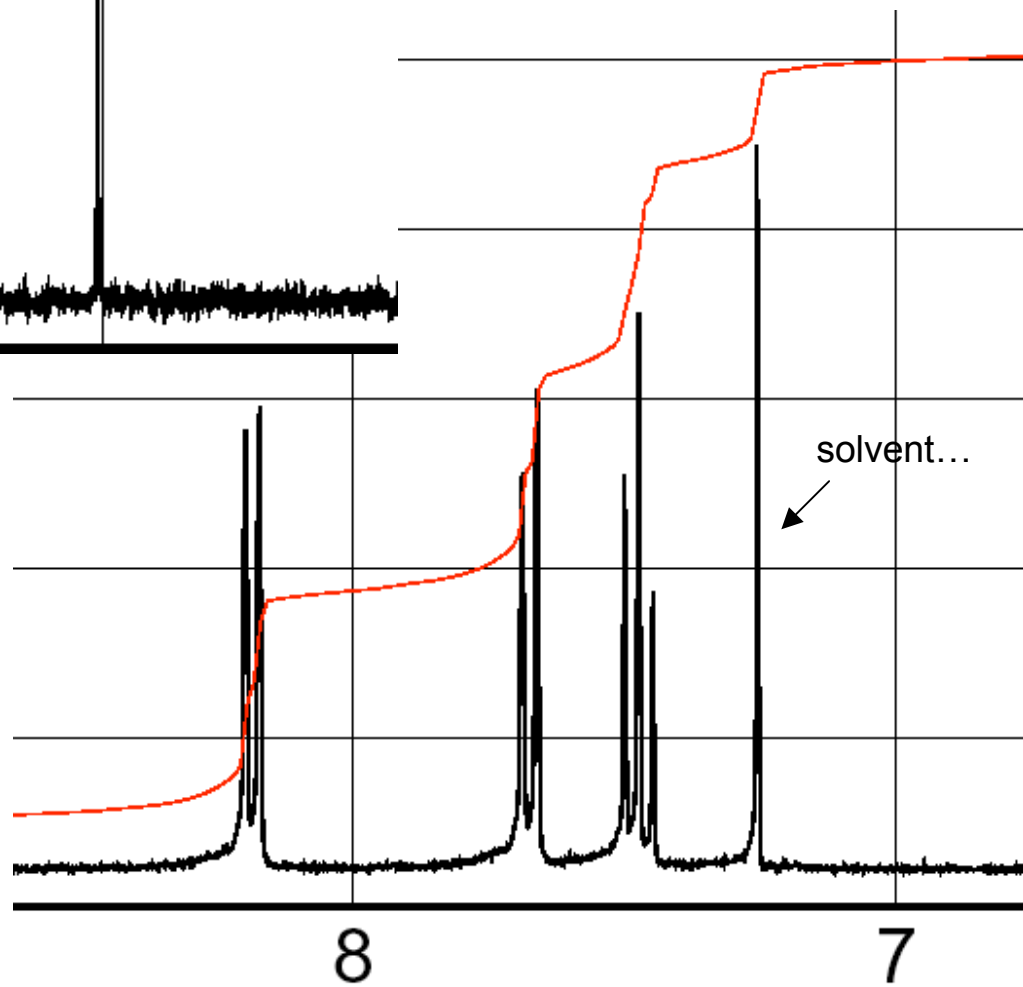
Name: _____

Problem 4

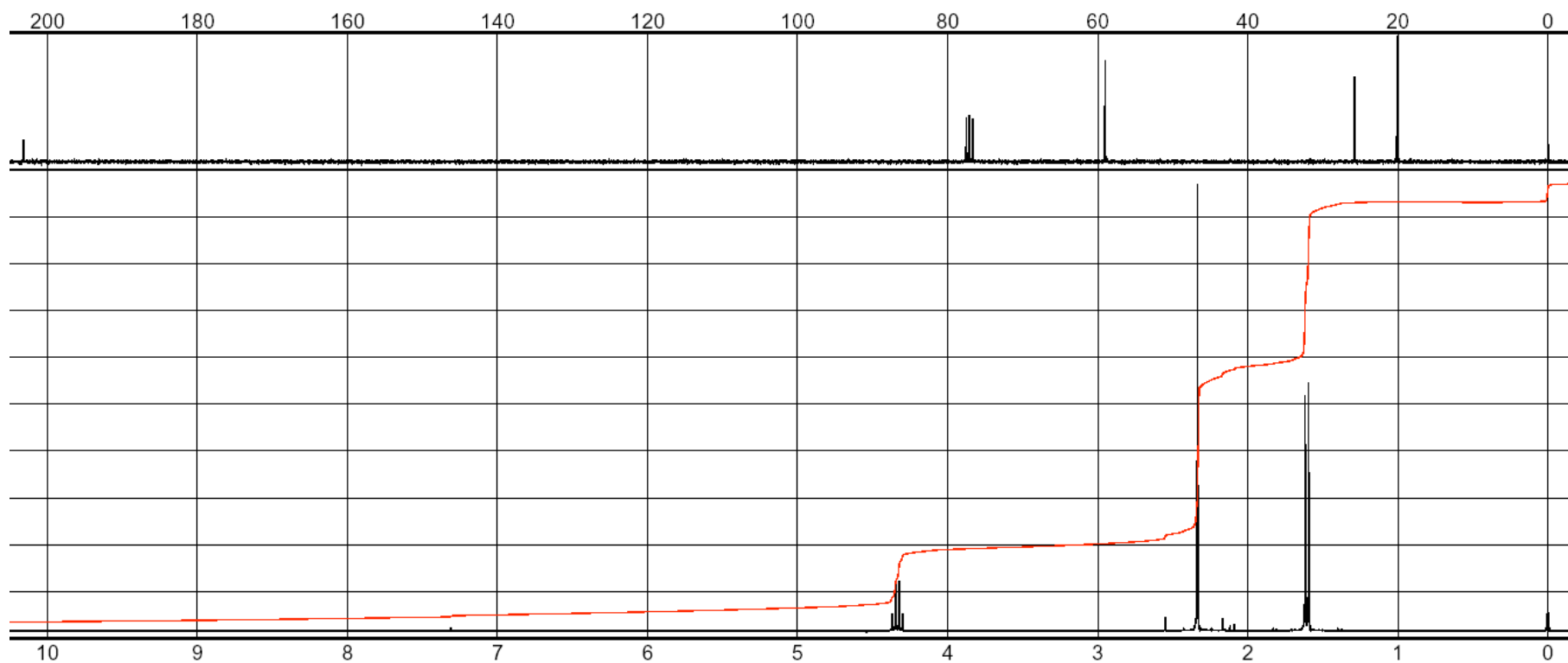


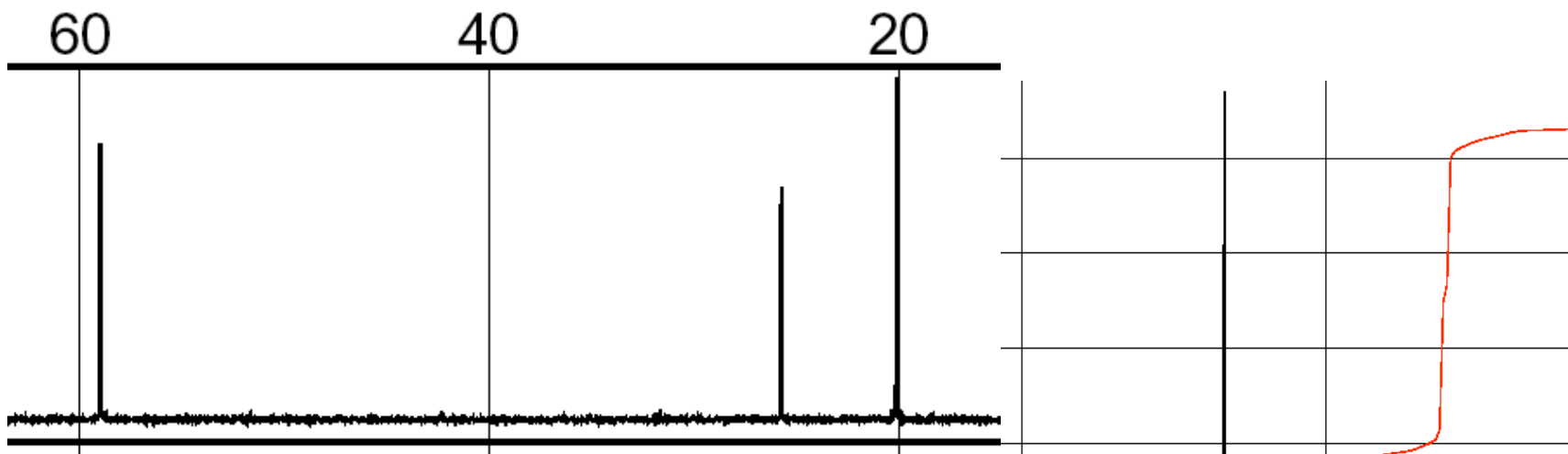


Problem 4 - Expansions

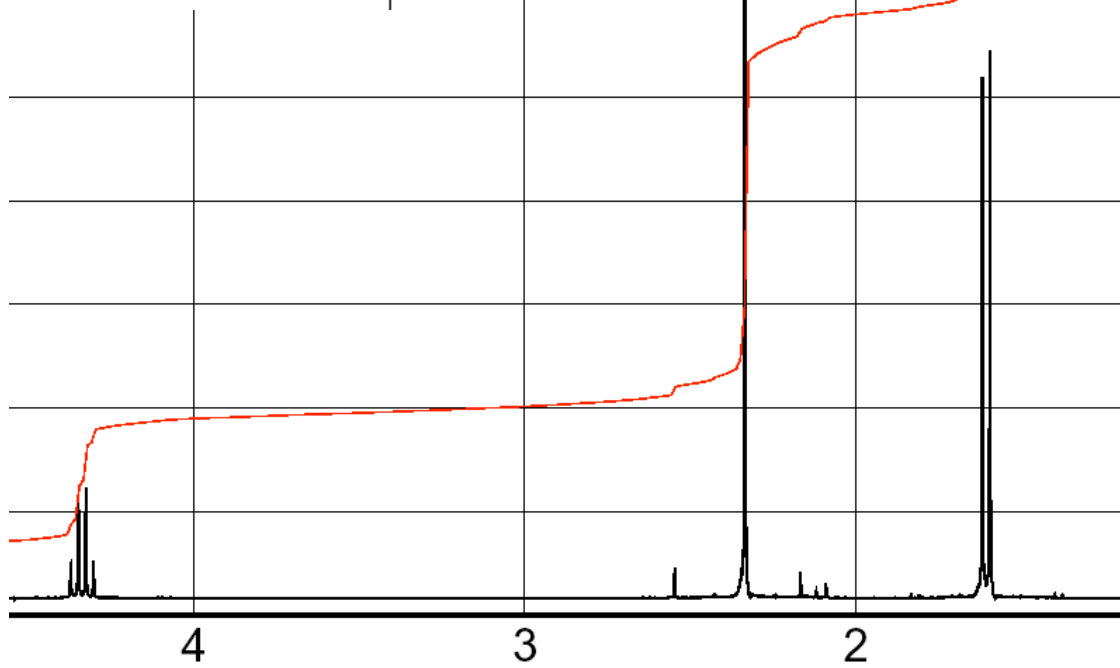


Problem 5 - Compound A

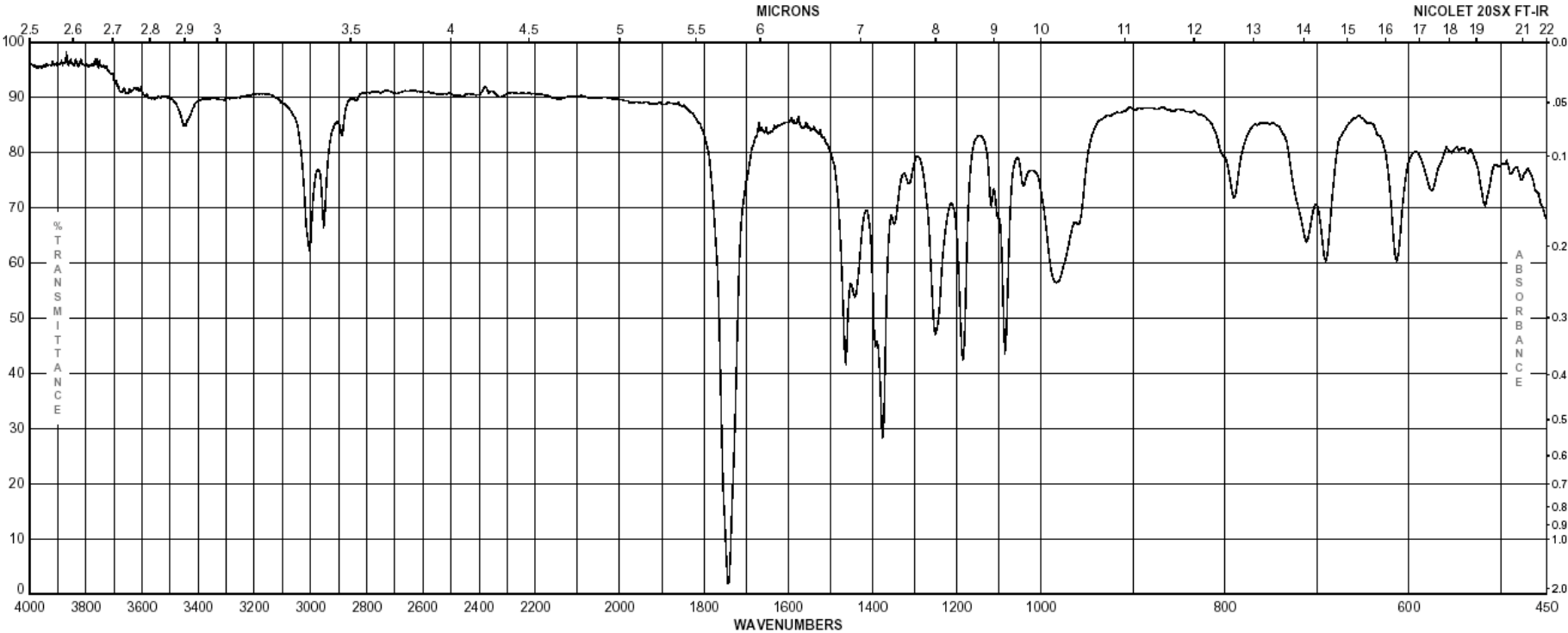




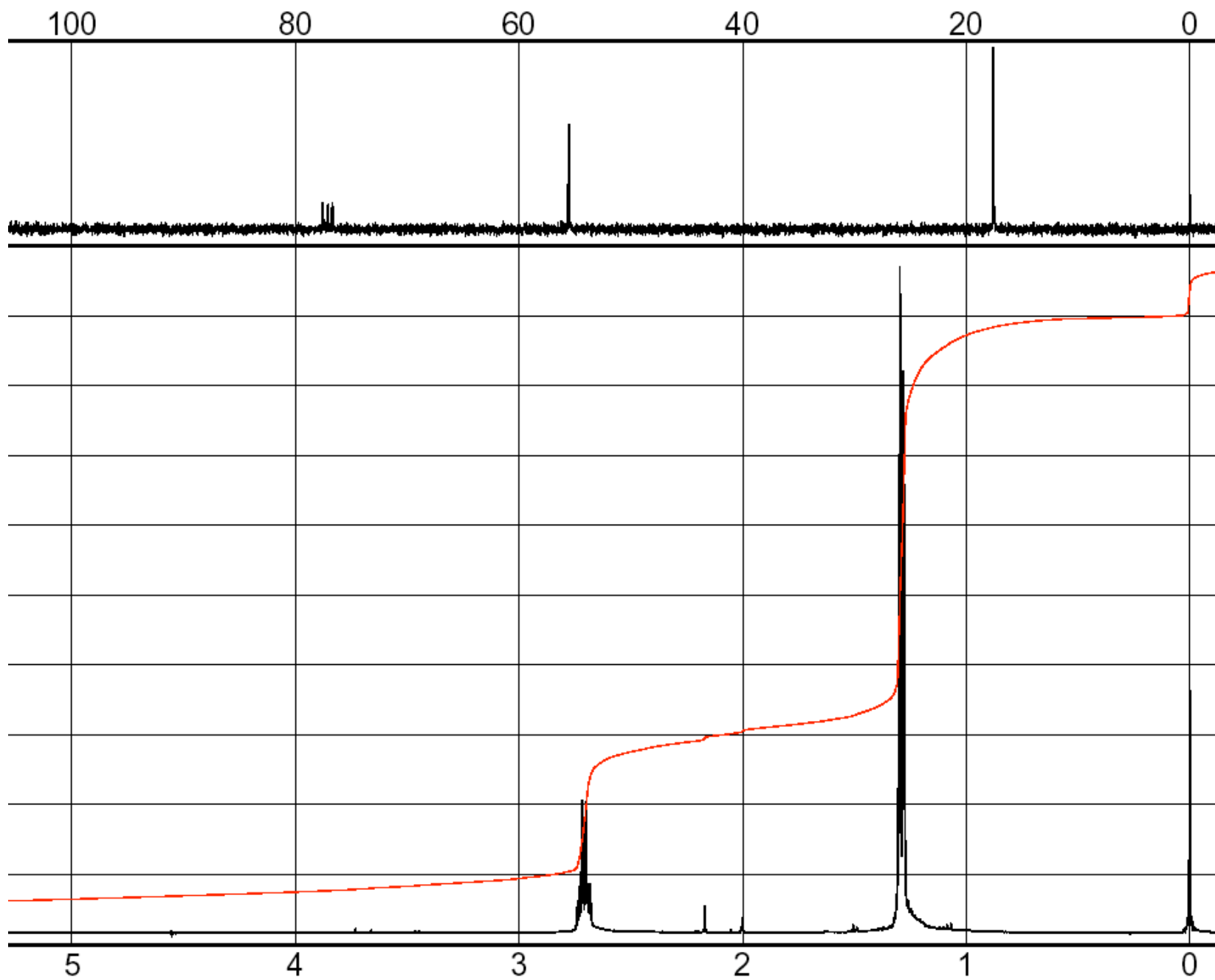
Problem 5 - Compound A
Expansions

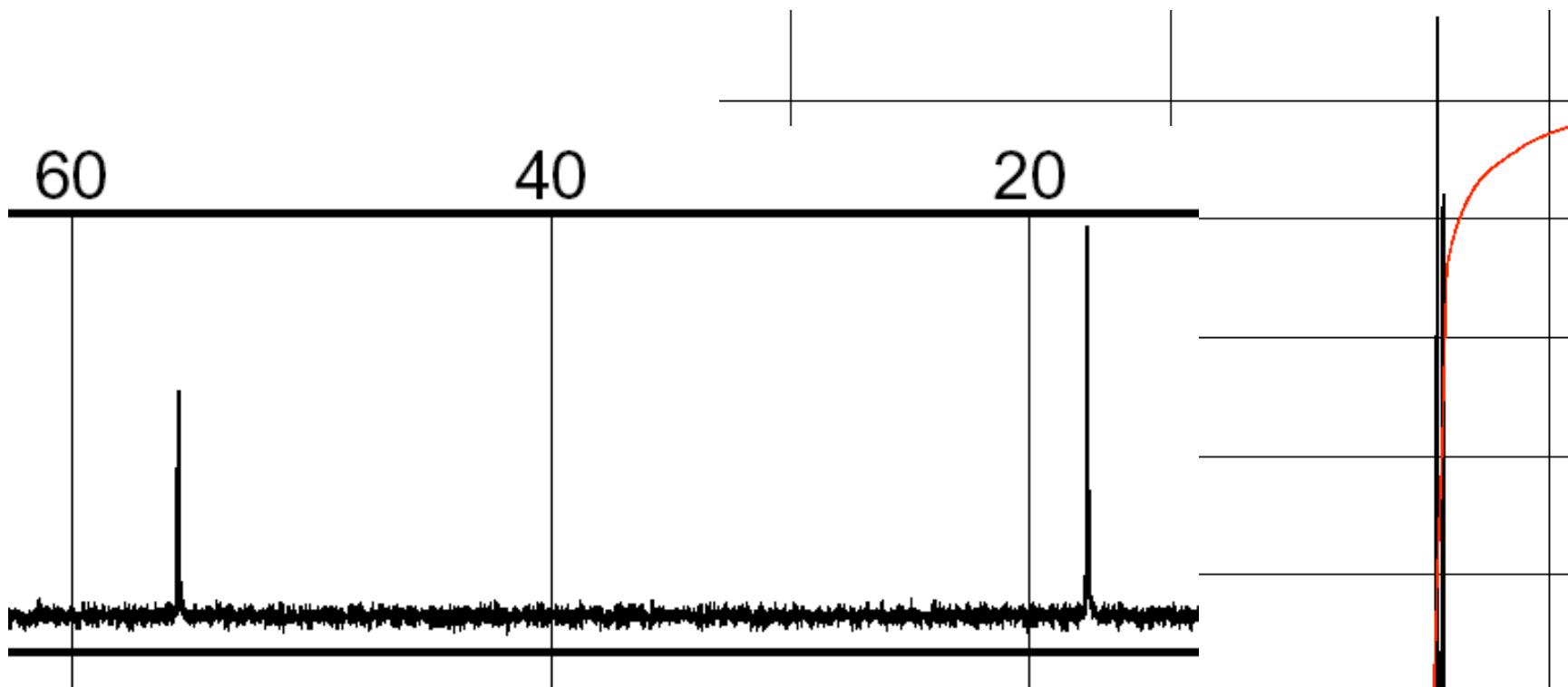


Problem 5 - Compound A - IR

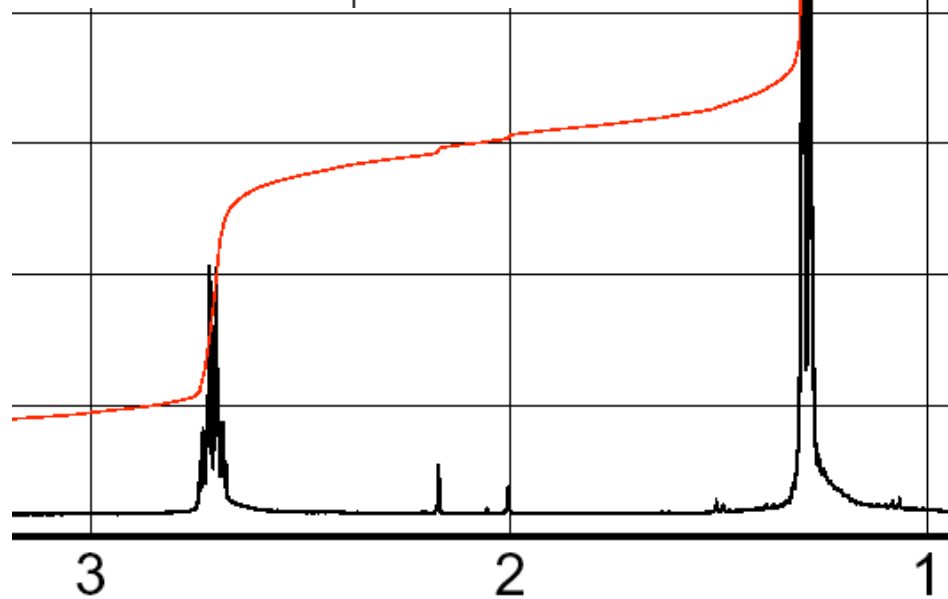


Problem 5 - Compound C

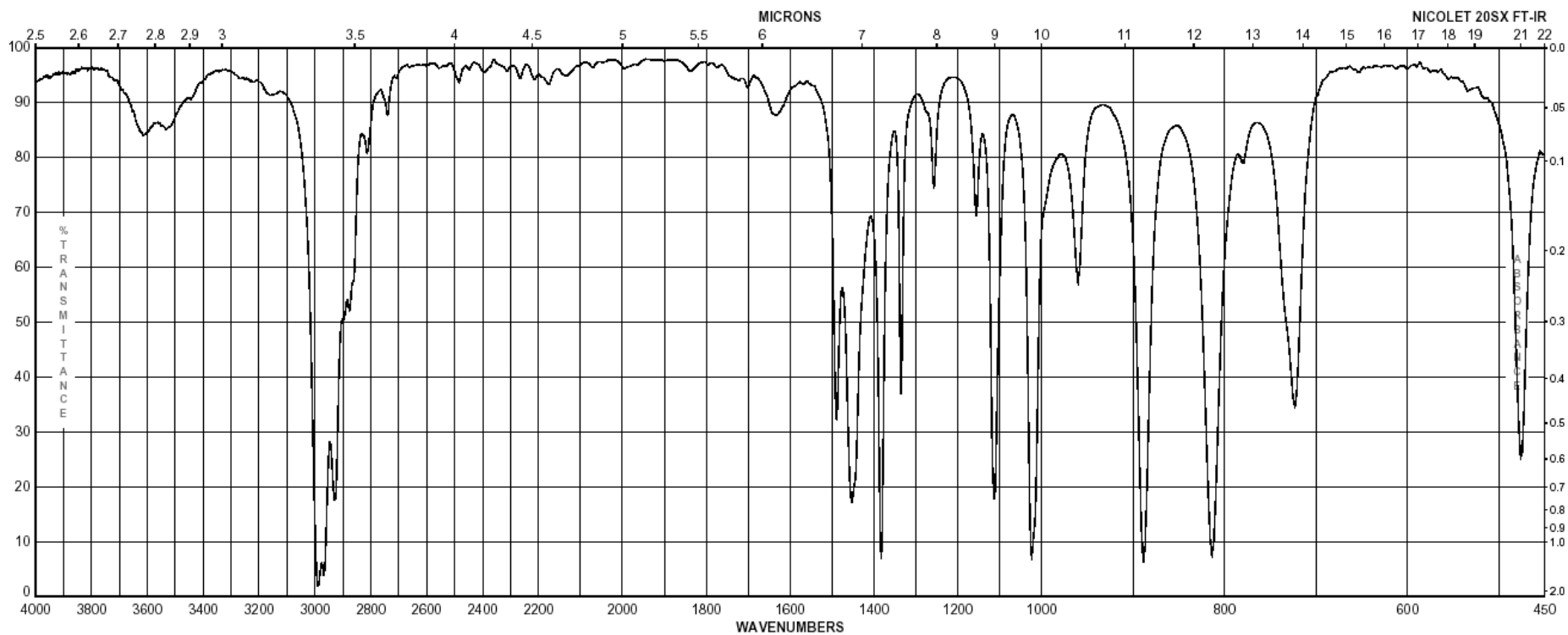




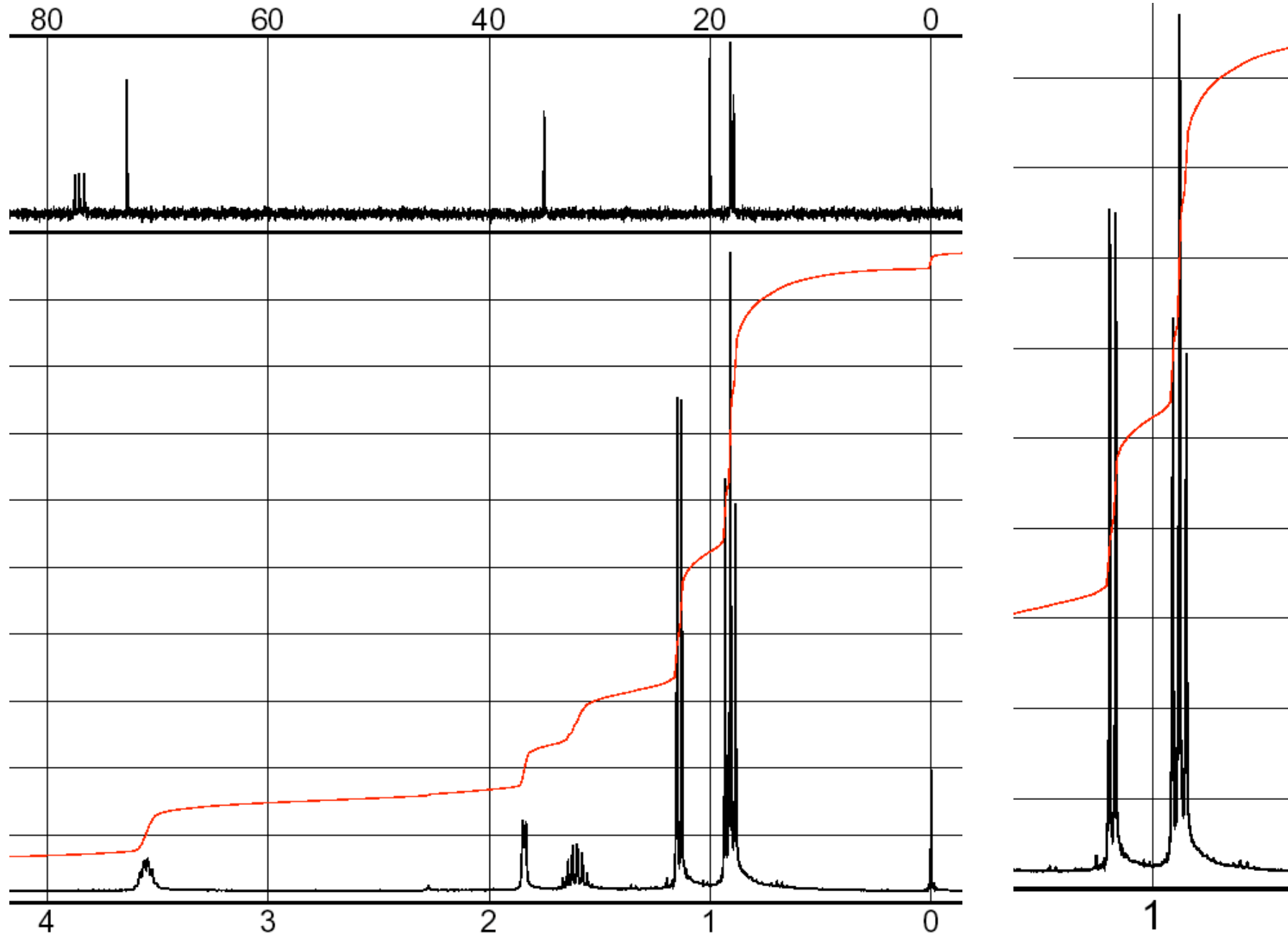
Problem 5 - Compound C
Expansions

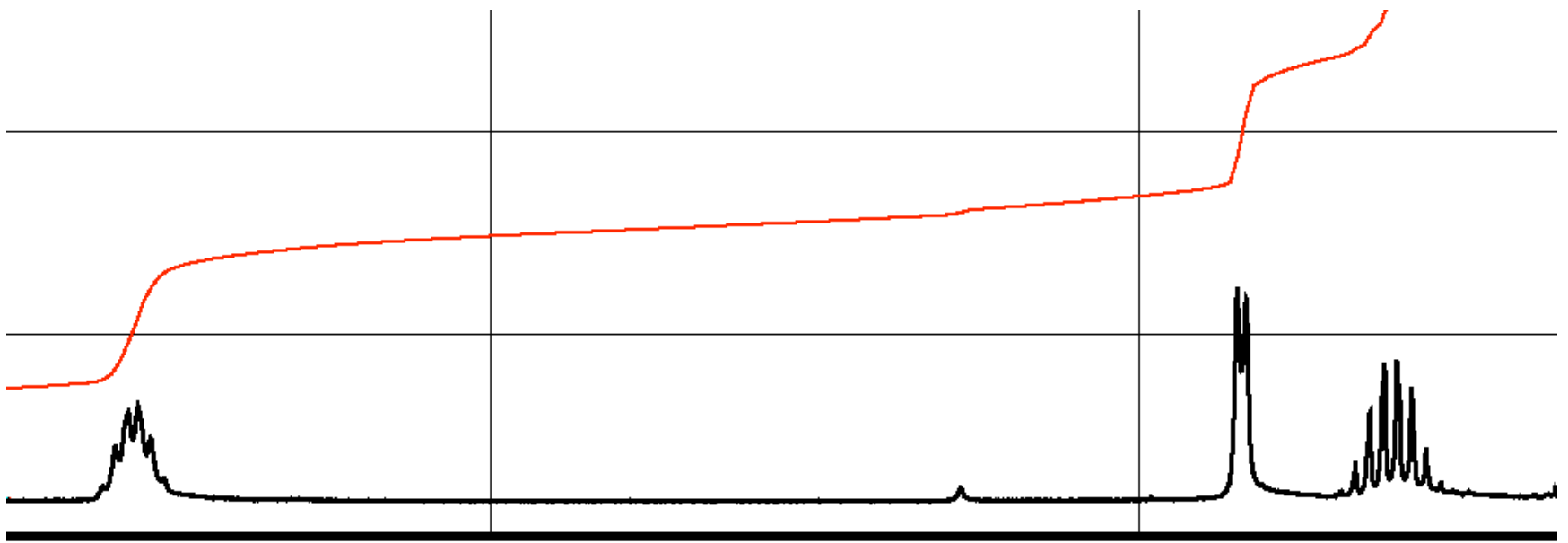
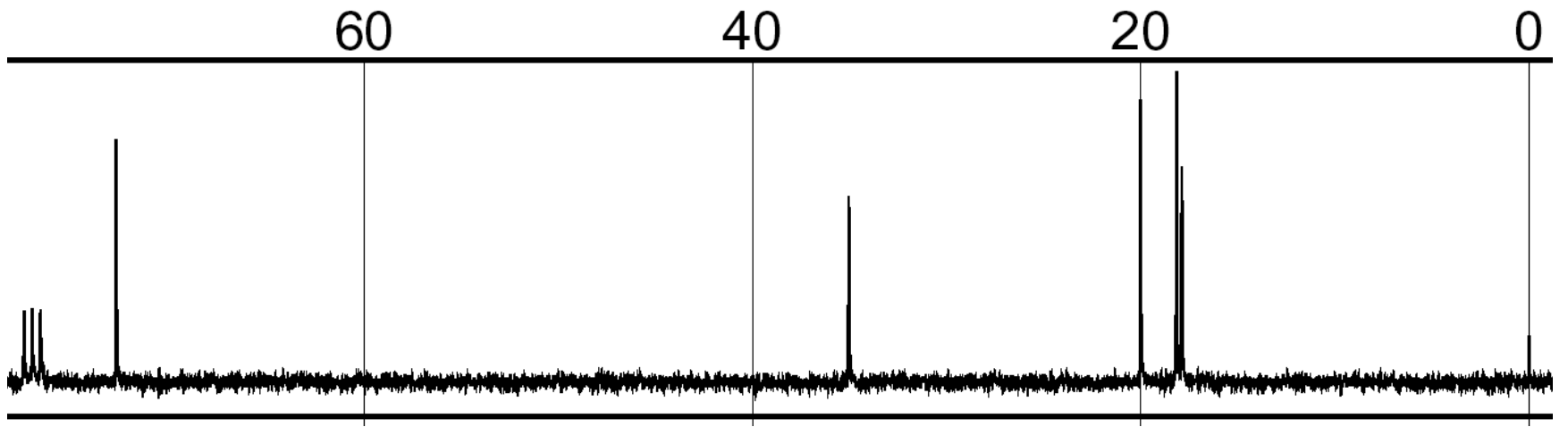


Problem 5 - Compound C - IR



Problem 6 - Compound D





Problem 6 - Compound D **3**

2

Expansions

Problem 5 - Compound D - IR

