

DAWSON COLLEGE
DEPARTMENT OF CHEMISTRY & CHEMICAL TECHNOLOGY
ORGANIC CHEMISTRY (II) 202-BZG-05
WINTER 2007
FINAL EXAMINATION

Teachers: E. Cadieux, I. Dionne, D. Montecalvo

Student Name and Number: _____

Instructions:

1. This examination package has 10 questions and 17 pages. It is your responsibility to ensure that there are no pages missing.
2. Please write your name and student number before beginning the exam.
3. Answer all questions directly on the exam pages in the spaces provided.
4. Write in ink or you may lose the right to grieve the exam grade.
5. Write clearly. Illegible answers will result in grade deductions.
6. Do not detach any of the sheets in this package.
7. Two blank pages are provided at the end of the examination package for your rough work. Your teacher will not look at any work written on those pages.
8. Calculators are not permitted.
9. Molecular models are permitted but may not be passed to other students.
10. Unless otherwise indicated, structural formulas must be shown with all hydrogen atoms, except in ring structures where bond-line formulas are permitted.

1. _____ / 16

5. _____ / 10

9. _____ / 25

Total _____ / 105

2. _____ / 8

6. _____ / 2

10. _____ / 10

Total _____ / 40

3. _____ / 15

7. _____ / 7

4. _____ / 6

8. _____ / 6

1. Provide appropriate names or structural formulas for the following: (16 marks)

(a)

(b)

2. Propose a structure for each of the following compounds based on the ^1H NMR information. (8 marks)

(a) $\text{C}_5\text{H}_{10}\text{O}$

0.95 δ doublet

2.10 δ singlet

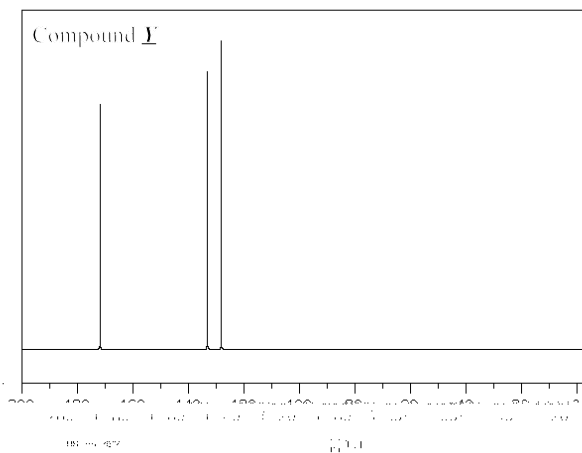
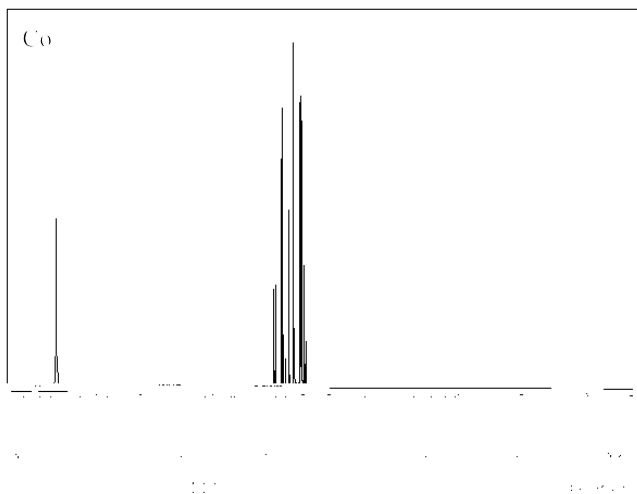
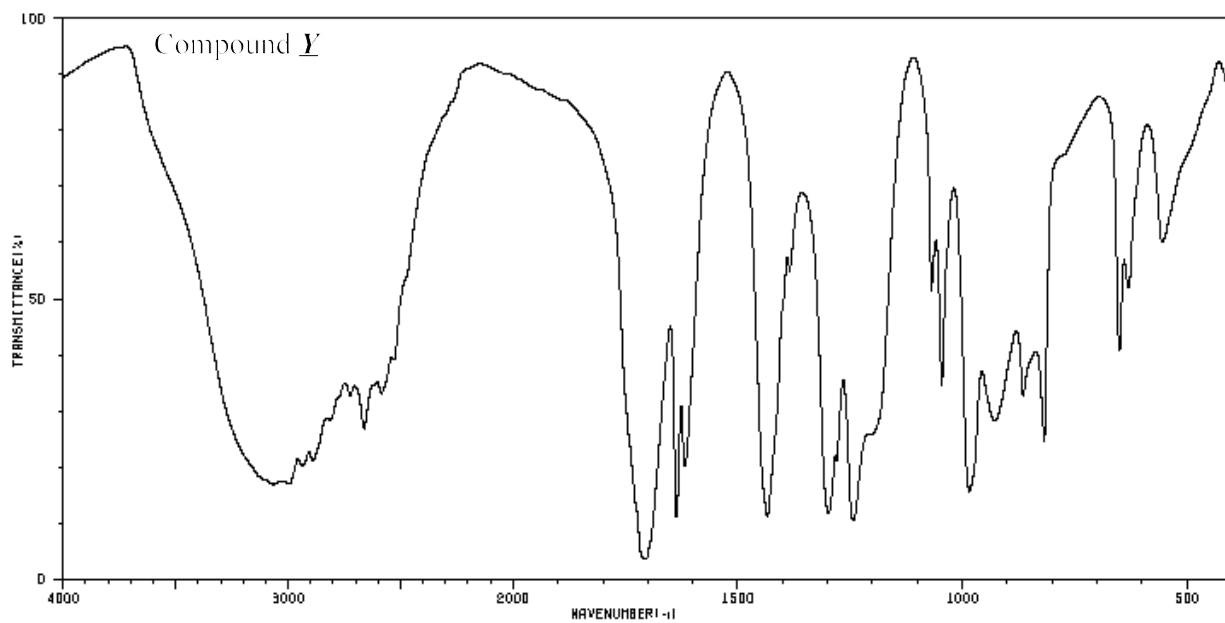
2.43 δ septet

(b) $\text{C}_4\text{H}_6\text{Cl}_2$

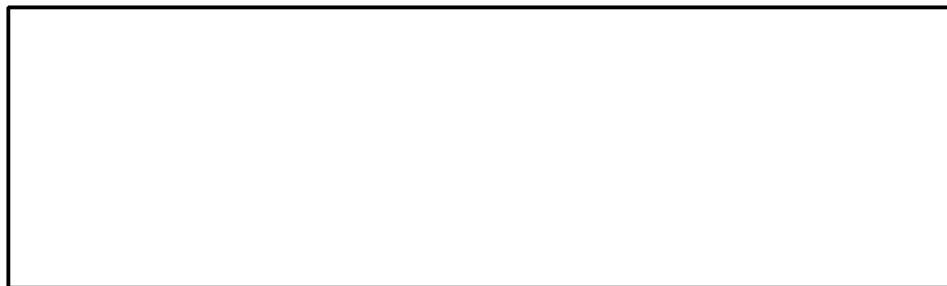
1.4 δ pentet (5 peaks)

2.1 δ triplet

3. An unknown chemical, X



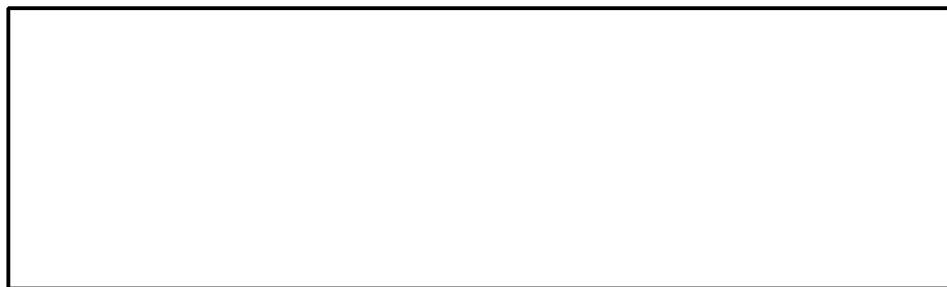
Proposed structures:



Compound X



Compound Y



Compound Z

4. (a) Why are NH_3 and CH_3NH_2 no longer nucleophiles in acidic solution? (2 marks)

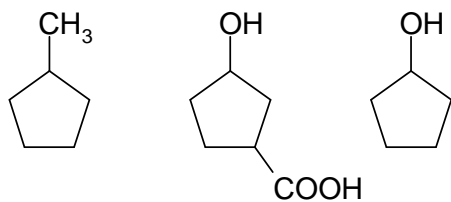
(b) Why does a Grignard reagent not attack and bond to the carbonyl carbon of a carboxylic acid? (2 marks)

5. Give a detailed step-by-step mechanism to show how the products of the following (10 marks) reaction are formed. Used the curved arrow convention to show electronic movements.

(a)

6. Rank the following compounds in order of decreasing solubility in water. (2 marks)

Do not explain.

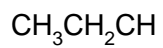


Answer: _____ > _____ > _____

7. (a) Indicate the aldehyde or ketone from which the following compound would be formed by an aldol addition (2 marks)

2-ethyl-3-hydroxyhexanal

- (b) What carbonyl compound and what phosphonium ylide are required in the last step of the Wittig synthesis of the following alkene? Provide two routes to achieve this synthesis. (4 marks)



- (c) The Gabriel synthesis is used to make what class of compound (functional group)? (1 mark)

8. Provide brief answers to the following questions, concerning your laboratory work. (6 marks)

(a) What technique did you use to separate the clove oil (eugenol) from the ground cloves?

(b) What apparatus was used to remove a volatile solvent from a final nonvolatile product, other than a distillation?

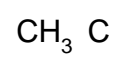
(c) What color is β -carotene? Is this compound uv-visible active?

(d) Name 2 techniques, other than spectroscopy (IR, NMR, MS, uv-vis), that can be used to verify the identity of a product.

9. Supply missing major organic products.

(25 marks)

(a)



(b)

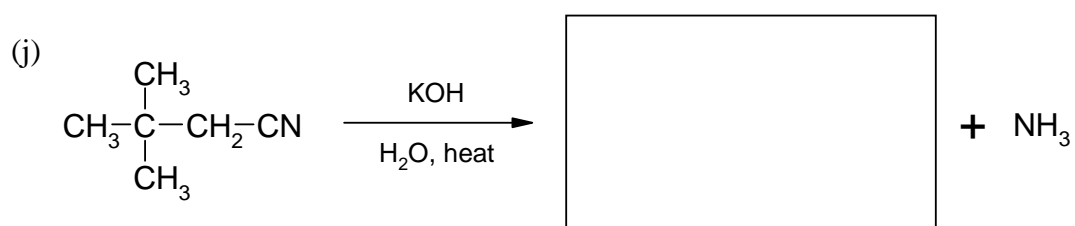
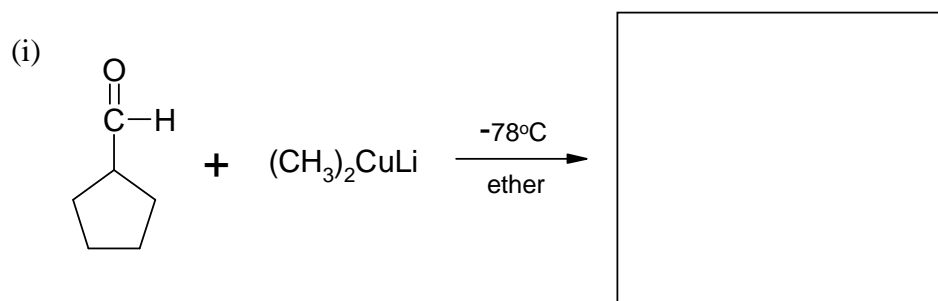
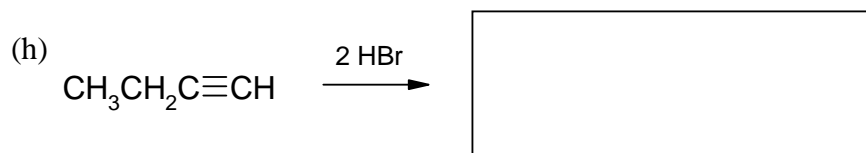
(c)

(d)

(e)

(f)

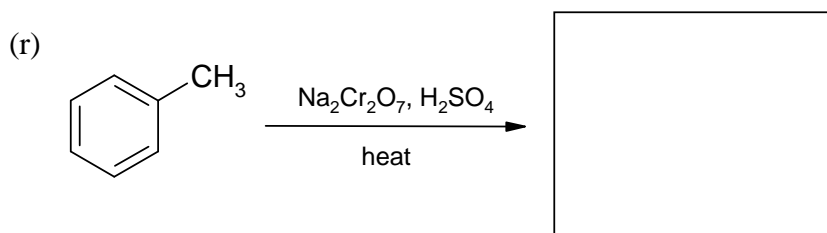
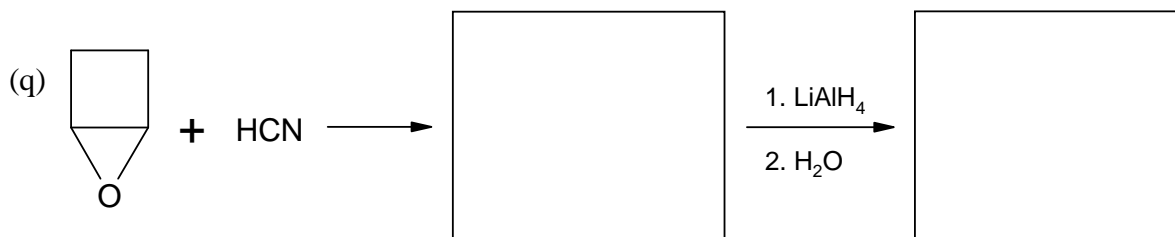
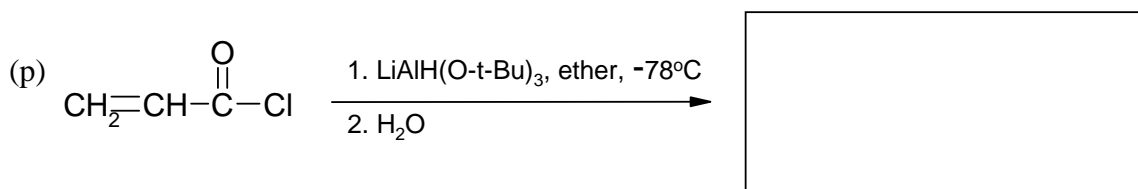
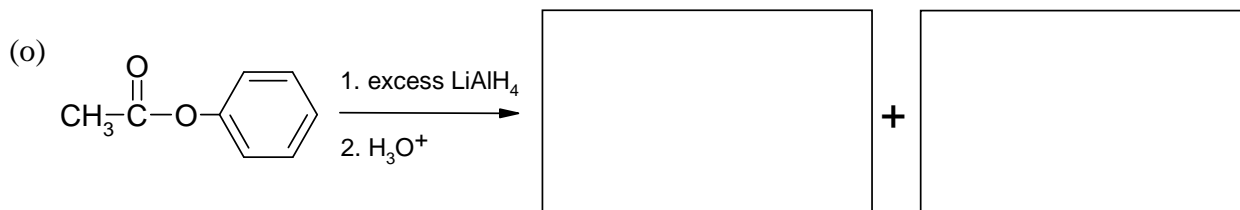
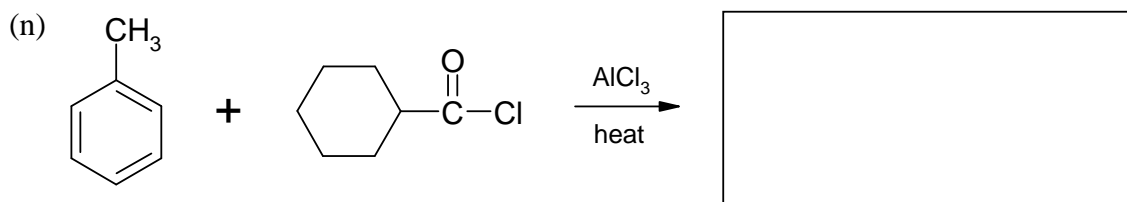
(g)



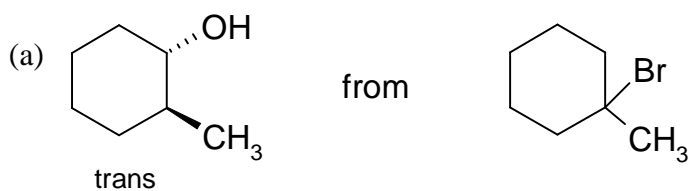
(k)

(l)

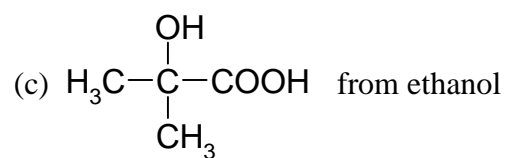




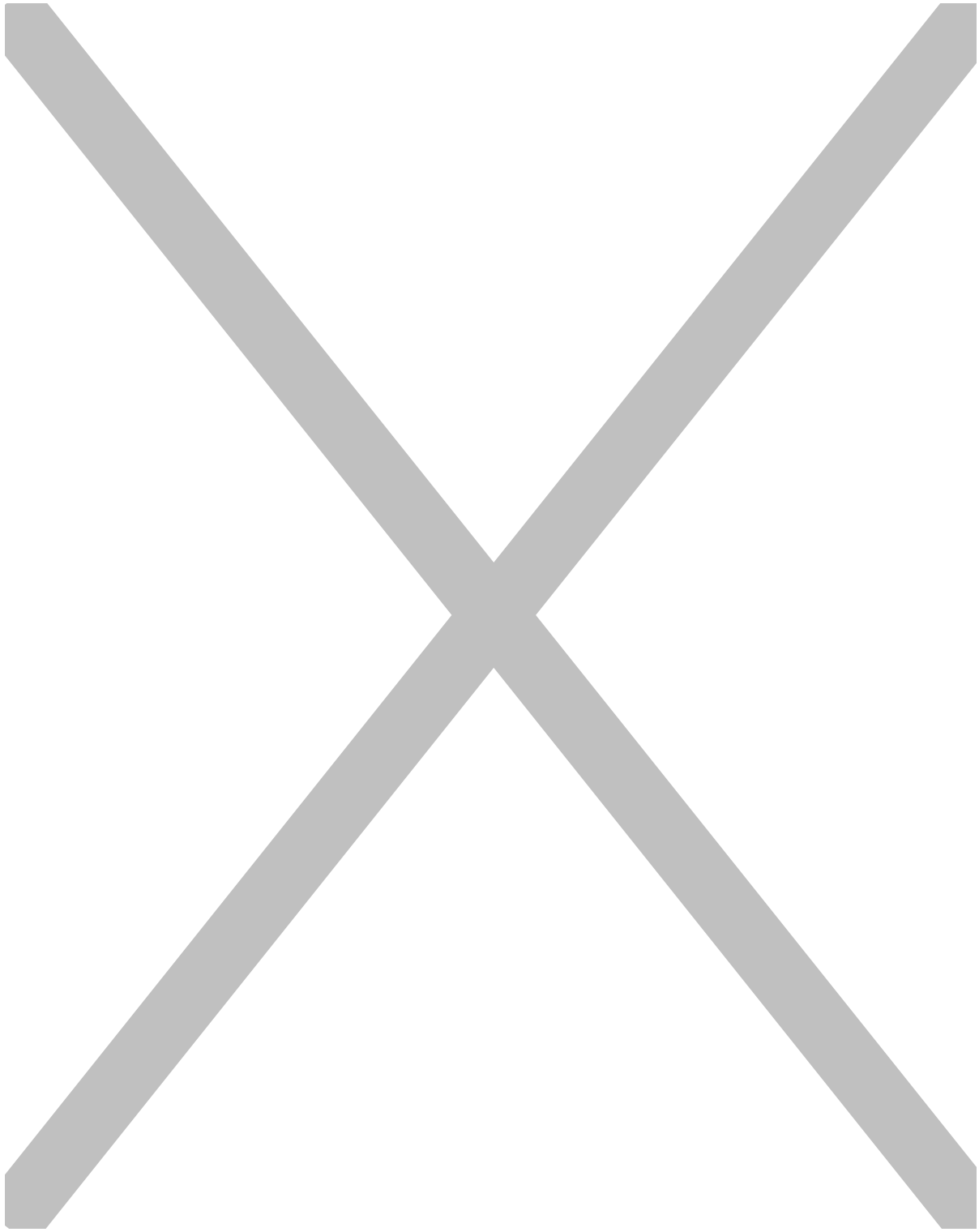
10. Show how you would carry out the following syntheses. You must begin with the indicated chemical(s) and you may use any necessary inorganic or organic reagents. (10 marks)
All your reactions must produce the desired products in good yields and in a reasonably pure state.



- (b) 3-heptanone from 1-propanol



For your rough work. Your teacher will not look at any work written on this page.



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