

University of Canterbury

Mid Year Examination and Test Period 2008

Prescription Number(s):	CHEM 322
Paper Title:	Organic Chemistry

Time Allowed: 2.5 hours

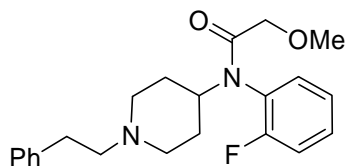
Number of pages: SEVEN

Answer **THREE** questions out of four.

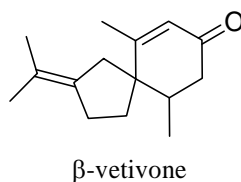
All questions are of equal value.

1. Answer **THREE** of the following (a) – (d). Use retrosynthetic analysis to aid in the design of your answers to parts (a), (b) and (d).

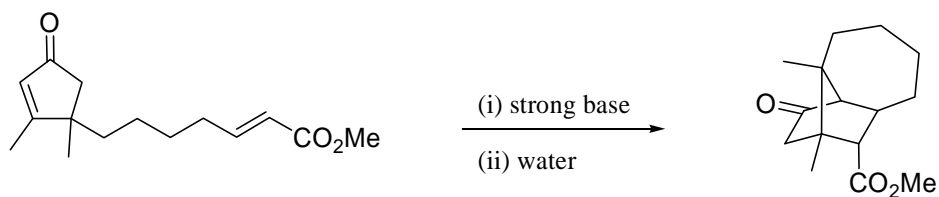
(a) How might you prepare the powerful opioid painkiller Ocfentanil:



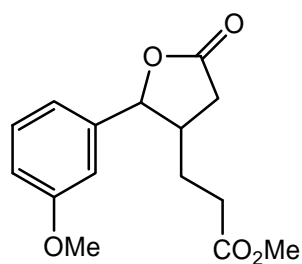
(b) How might you prepare β -vetivone



(c) Draw a stepwise mechanism for each step in the following reaction:

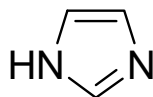


(d) How might you prepare the following lactone:

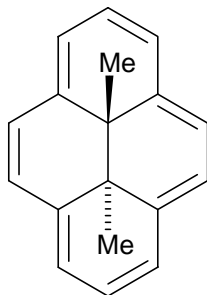


2. Answer the following (a) – (e).

- (a) For the structure below indicate whether it is aromatic, anti aromatic or non aromatic; explain your reasoning.



- (b) Explain the observation that in a $^1\text{H-NMR}$ spectrum of the molecule shown below the methyl protons occur at -4.25ppm , while the ring protons occur in the range $8.14 - 8.67\text{ ppm}$?



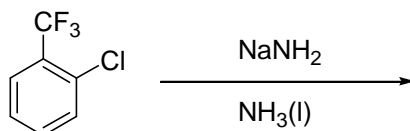
- (c) Answer **either** (i) **or** (ii)
- (i) The chemistry of C_{60} has been classified into the following three areas: intercalation compounds, exohedral compounds and endohedral compounds. Explain what these terms mean.
- (ii) Describe, in words, the structure of C_{60} .

Question 2 continued on following page

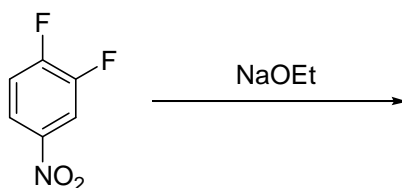
Question 2 continued

(d) Answer **either** (i) **or** (ii)

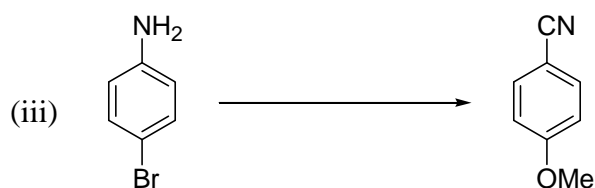
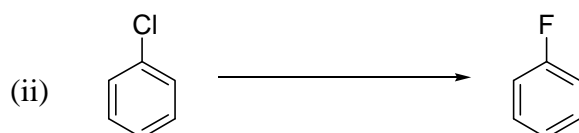
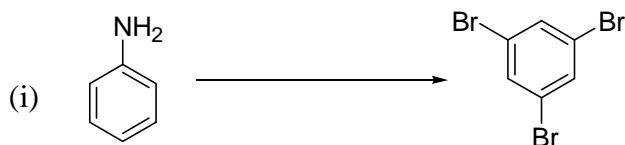
- (i) Give the major product of the following reaction. Describe why you would expect this to be the major product. Include a reaction mechanism in your answer.



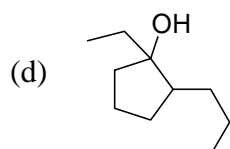
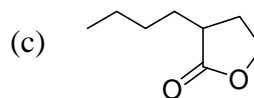
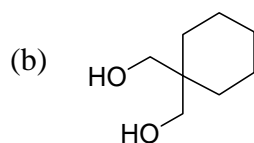
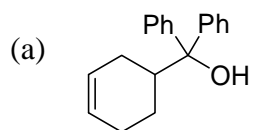
- (ii) Give the major product of the following reaction. Describe why you would expect this to be the major product. Include a reaction mechanism in your answer.



(e) Suggest reagents for **TWO** of the following transformations (all schemes require more than one step).

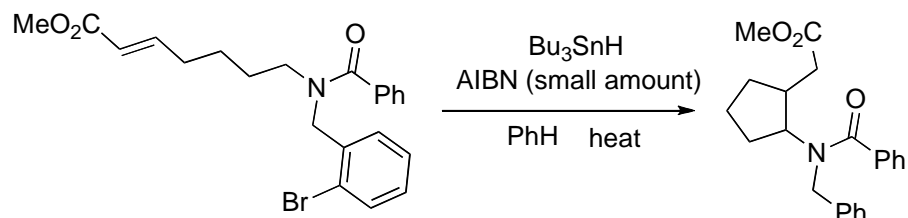


3. Show how **FOUR** of the following molecules, (a) – (e), could be prepared by using retrosynthetic analysis to aid in the design of your synthesis.

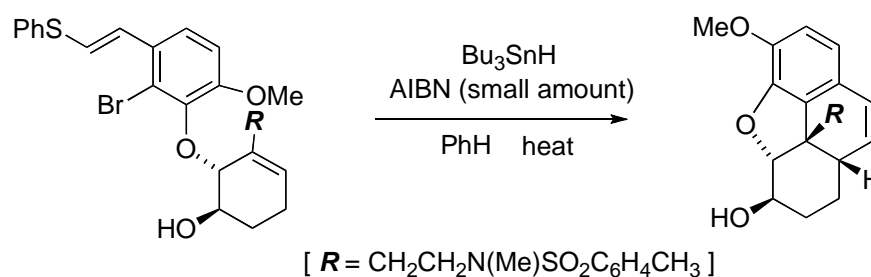


4. Provide reasonable mechanisms for **TWO** of the following radical reactions (a) – (c). Use your knowledge of radical chemistry to explain issues of regioselectivity. An explanation of stereochemical aspects of these reactions is **not** required.

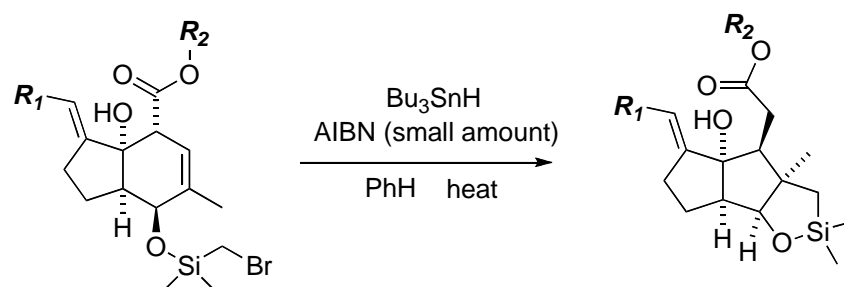
(a)

(reference: Curran, *J. Chem. Soc., Perkin Trans 1*, **1994**, 1377)

(b)

**Hint:** the R group does not participate in the reaction.(reference: Parker, *J. Am. Chem. Soc.*, **1992**, 114, 9688)

(c)

**Hint:** the R_1 and R_2 groups do not participate in the reaction.(reference: Kessabi and Houk, *Org. Lett.*, **2008**, 10, 2255)**END OF PAPER**