KJM3200/KJM4200, spring 2008

Problem set 5 (for discussion on May 28, 2008)

Exercise 1 = Exercise 3 from Problem set 4, NB! Corrected version below

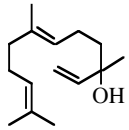
(Try to answer the question without looking up the structure of γ-bisabolen)

a) The natural product γ-bisabolen has the molecular formula $C_{15}H_{24}$. Catalytical hydrogentation (H_2-gas, Pt-cat., AcOH) of γ-bisabolen gives comp. **A** ($C_{15}H_{30}$). How many unsaturations are there in γ-bisabolen, and how many of these are rings.

b) In cyclohexane γ-bisabolen may be reduced to **B** $C_{15}H_{28}$). Ozonolysis of **B** gives 6-methyl-2-heptanone and 4-methyl cyclohexanone. Draw **B**.

c) Ozonolysis of **γ-bisabolen** followed by oxidative work up gives among other things acetone and 4-oxopentanoic acid. Formic acid is not a product. Draw possible structures of γ-bisabolen

d) γ-Bisabolen can be formed from the natural product nerolidol. Suggest a mechanism and the structure for γ-bisabolen



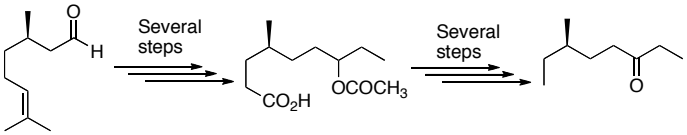
Nerolidol

Exercise 2 = Exercise 5 from Problem set 4

Exercise 3

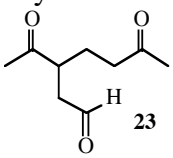
(Try to answer the question without looking up the structure of limonene)

a) The natural product (+) citronellal has been used in the synthesis of the pheromone **22**. Explain how (+) citronellal can be converted to the intermediate **21**.



(+) Citronellal **21** **22**

b) The molecular formula of limonene is $C_{10}H_{16}$. When limonene is reacted with H_2-gas in the presence of a Pt-catalyst a compound with the molecular formula $C_{10}H_{20}$ is formed. Ozonolysis of racemic limonene followed by treatment with Zn/AcOH, gives compounds **23** and **24**. ^{1}H NMR of limonene shows 3 vinylic hydrogens. One of these is not coupling with any of the other vinylic hydrogens, but with hydrogens in the alkyl-area. Show possible structures of limonene



23

CH_2O

24

c) (±) Limonene can be synthesized by a reaction between 3-buten-2-one and a diene followed by a Wittig reaction. Explain.