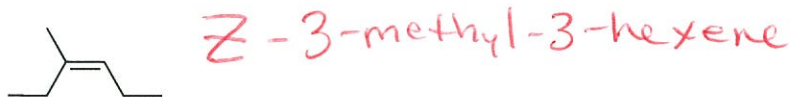


Organic Chemistry

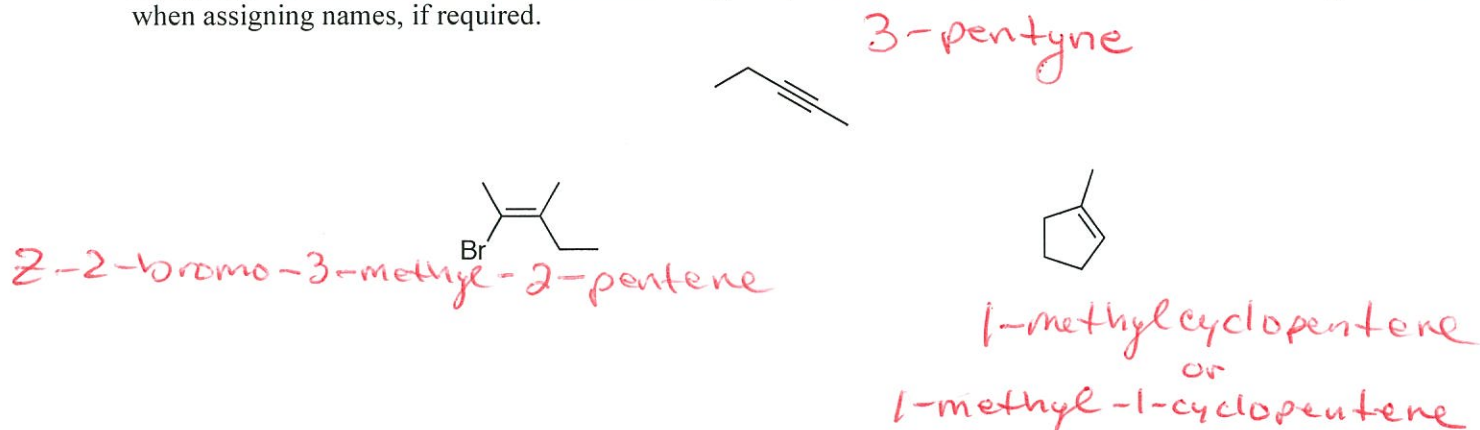
CHM 223

Exam 3 Study Questions

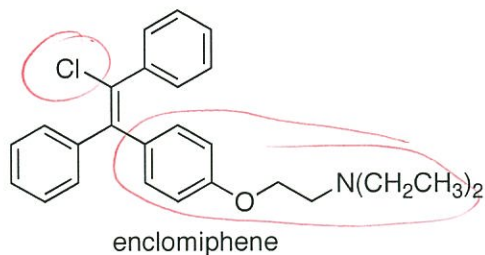
Provide the correct IUPAC name for the following molecule:



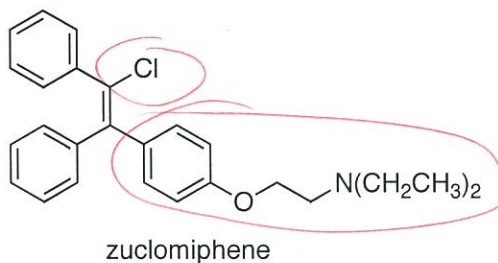
Assign appropriate IUPAC names to the following compounds. Make sure to use the correct *E/Z* assignments when assigning names, if required.



The fertility drug clomiphene (trade name Clomid) is sold as a mixture of diastereomers, enclomiphene and zuclomiphene. Designate each alkene as an *E* or *Z* isomer.



E

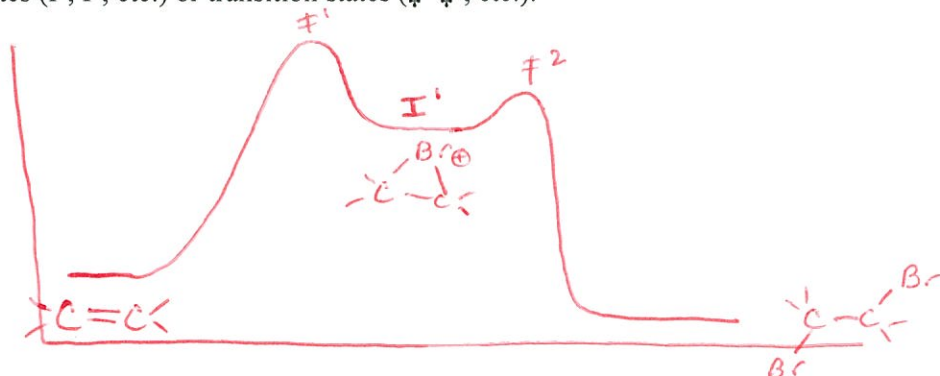


Z

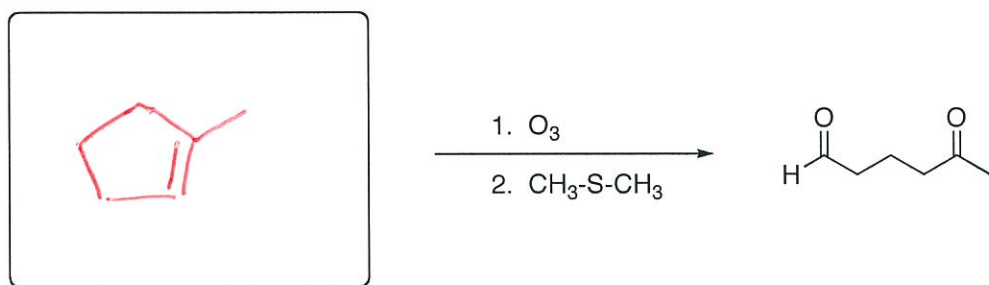
Draw the structure of (*E*)-3,6-dimethyl-3-octene



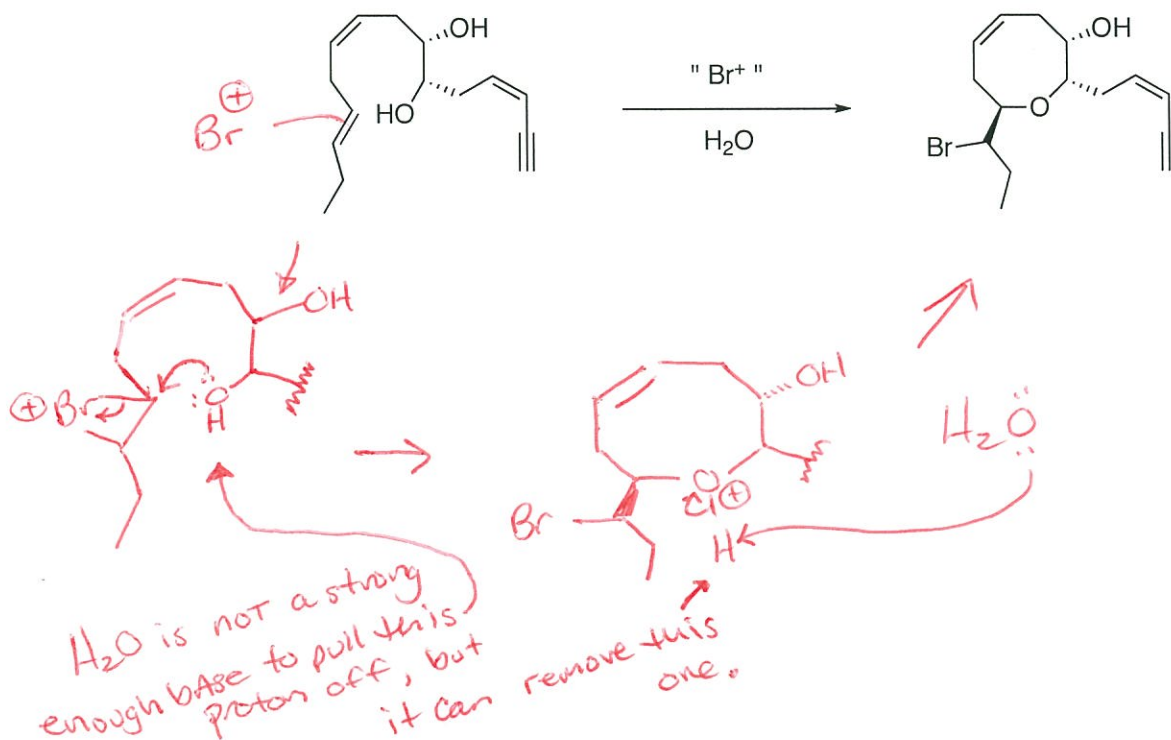
Draw an energy diagram for the two-step mechanism for the addition of Br₂ to CH₂=CH₂ to form 1,2-dibromoethane (assume that the reaction is exergonic). Label the starting material and product as well as any intermediates (I¹, I², etc.) or transition states (‡¹, ‡², etc.).



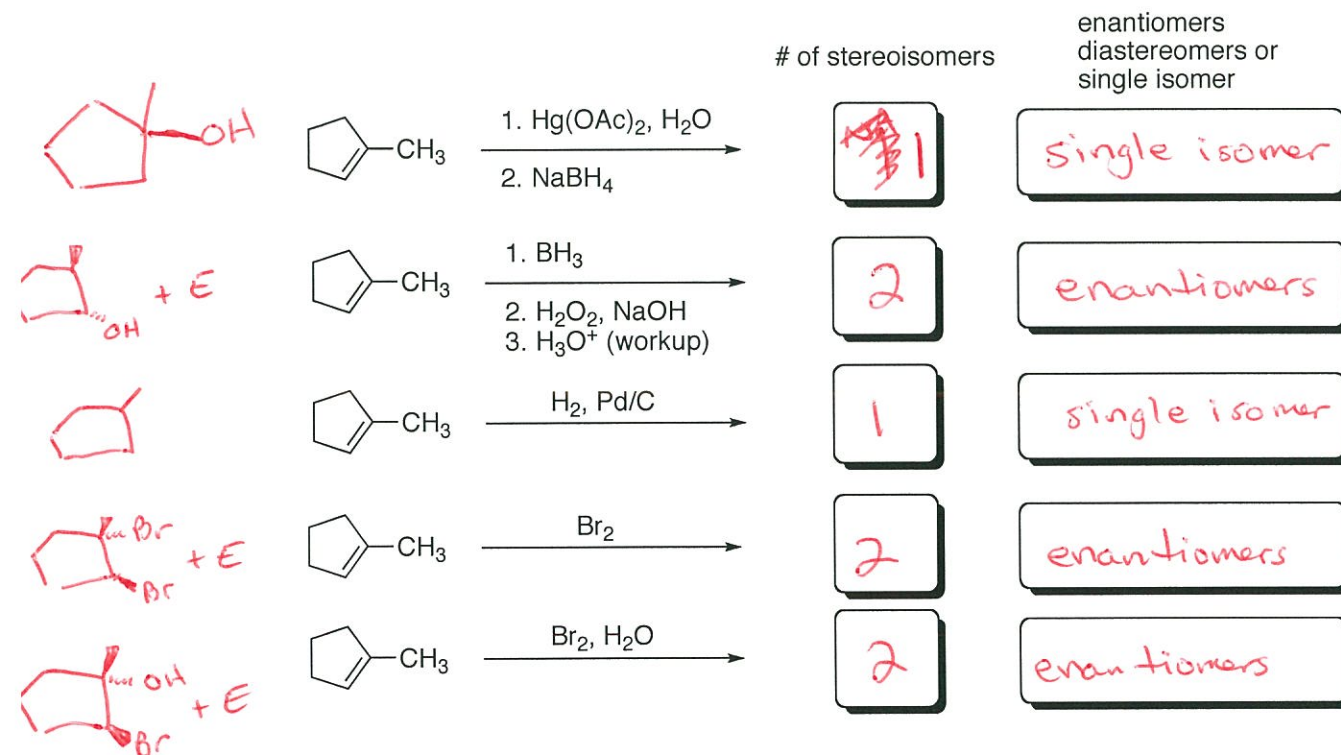
Draw the structure of the alkene that reacts with ozone followed by dimethyl sulfide to give the following product.



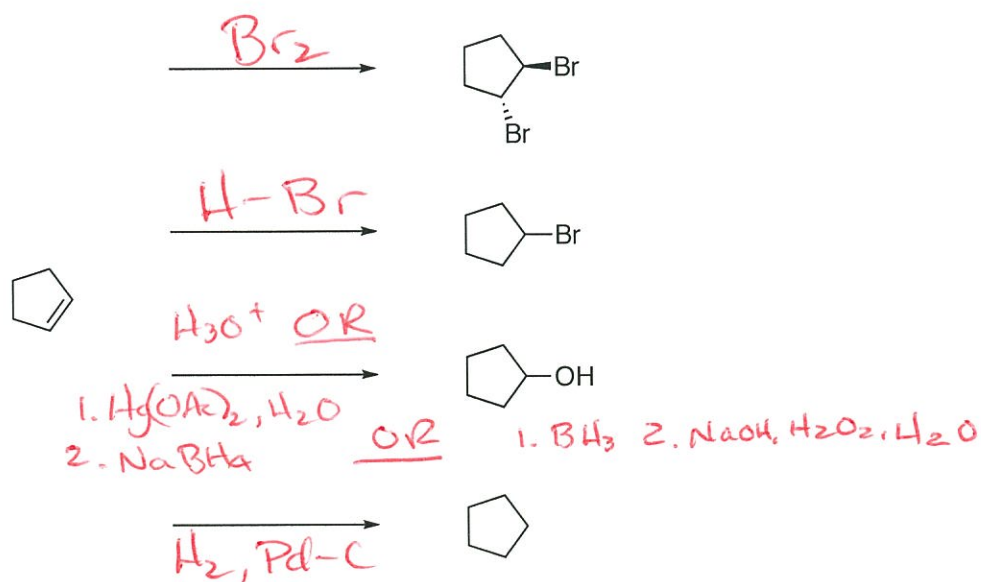
Isolated from marine algae, prelaureatin is thought to be biosynthesized from laurediol by the following route. Propose a mechanism. Hint: If you are looking for a base, assume there is LOTS of water around (since we're operating inside an organism).



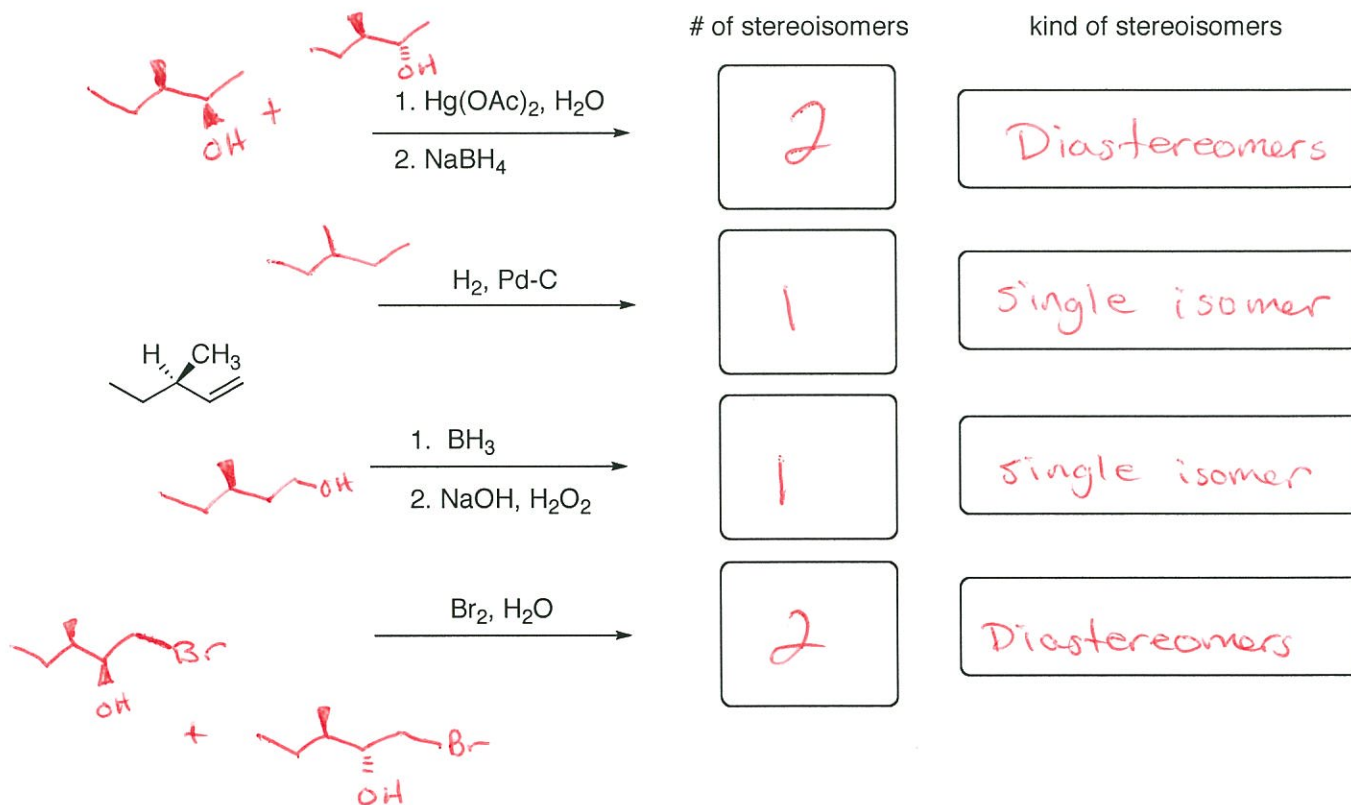
State the number and, if more than one, the kind of stereoisomers (enantiomers or diastereomers) formed when the following compounds are treated with the reagents indicated. If stereoisomers are not formed and only one product is created, enter "1" into the box for "# of stereoisomers":



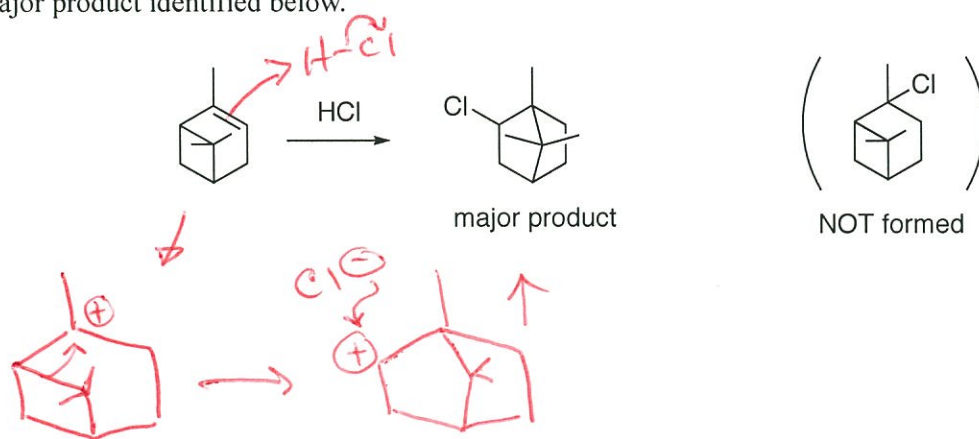
Show how to convert cyclopentene to the following 4 compounds by writing the appropriate reagent(s) at each reaction arrow. There may be more than one correct answer.



State the number and, if more than one, the kind of stereoisomers (enantiomers or diastereomers) formed when the following compounds are treated with the reagents indicated. If stereoisomers are not formed and only one product is created, enter "1" into the box for "# of stereoisomers" and "single isomer" in the box for "kind of stereoisomers":

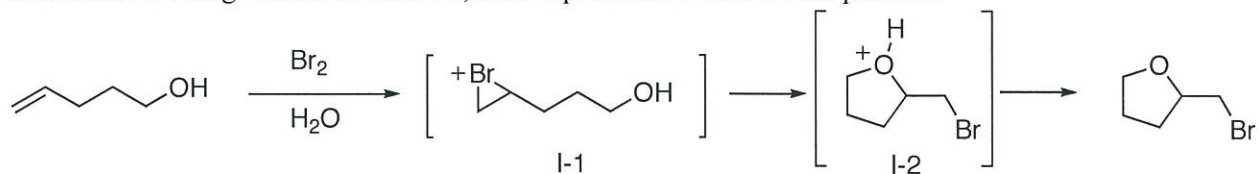


Treatment of α -pinene with hydrochloric acid yields the major product shown below, NOT the direct Markovnikov addition product. Draw a stepwise, arrow pushing mechanism that supports the formation of the major product identified below.

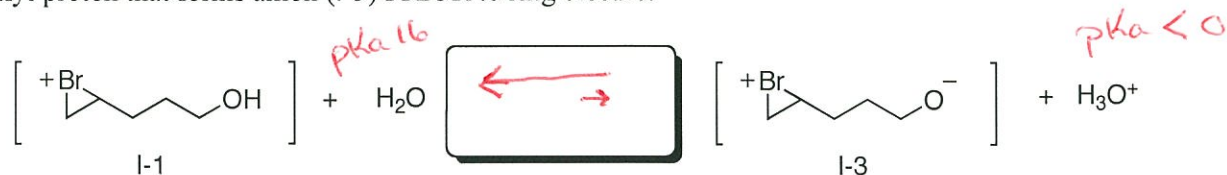


1,2-shift

The following intramolecular ring closure is initiated by formation of an intermediate bromonium ion (I-1) that underwent ring closure to form I-2, then deprotonation to form the product.



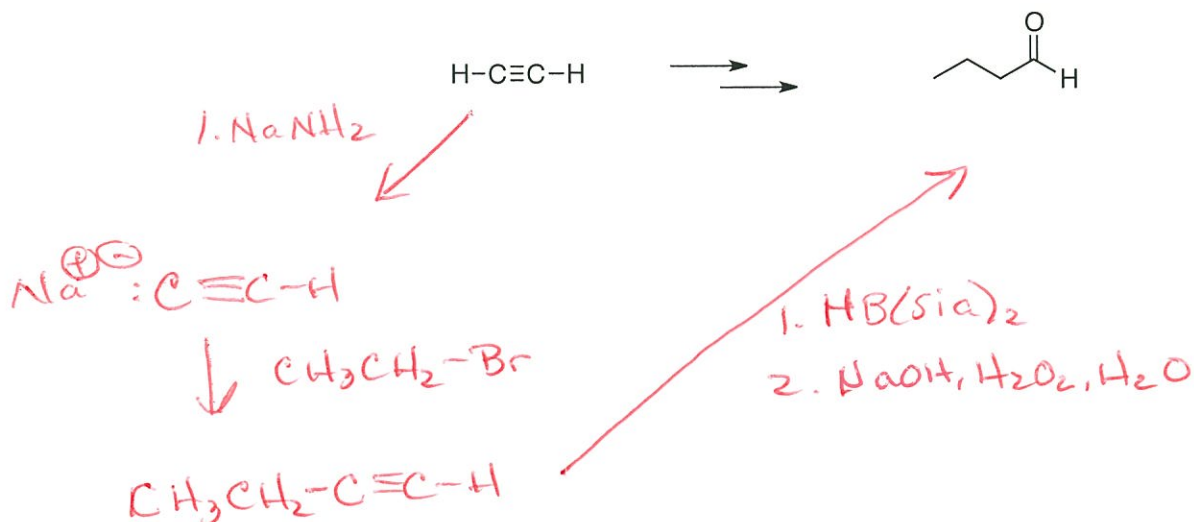
SOME, however, may propose an alternate mechanism that suggests water first acts as a base to remove the hydroxyl proton that forms anion (I-3) PRIOR to ring closure.



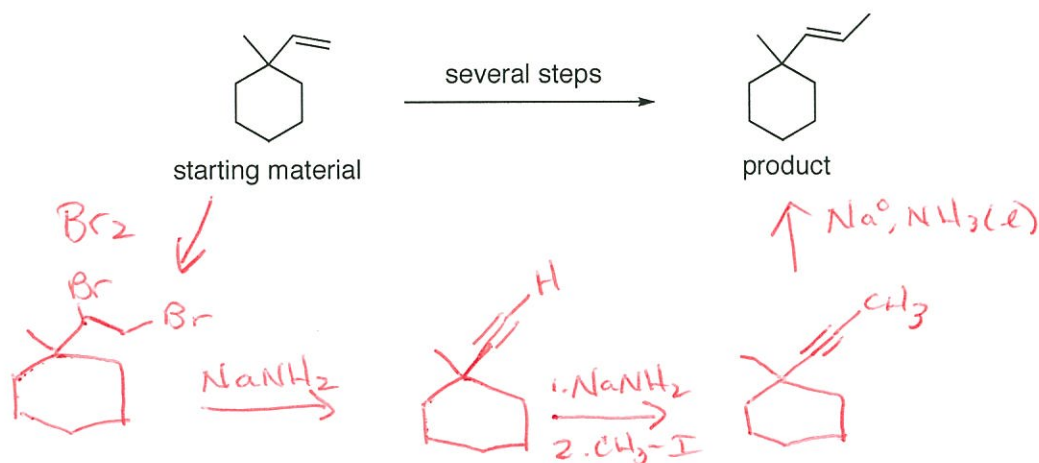
Using the approximate pKa's from a table, show in which direction the equilibrium lies in the above reaction (sketch the equilibrium arrows you determine in the empty box between starting materials and products). Make sure to indicate what the approximate pKa difference between the acid and conjugate acid is?

Don't worry about this for the 3rd exam.
This is more of a Final-exam type question.

Starting with acetylene, propose a synthesis of 1-butanal (provide an ordered list of reagents).



Show how one would perform the following multi-step transformation. There is no need to show mechanisms, only those reagents necessary - in the correct order. Partial credit will be given for showing a retrosynthetic analysis (what chemical intermediate immediately preceded the product, and so on until you get to the starting material), and full credit will be given to the correct reagents in the correct numbered order.



In the spaces to the right, enter the reagents necessary to accomplish the following transformations.

